OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

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JANUARY 31, 1955

AMERICAN

DYESTUFF REPORTER

Devoted to Textile Chemistry
BLEACHING · DYEING · PRINTING · FINISHING

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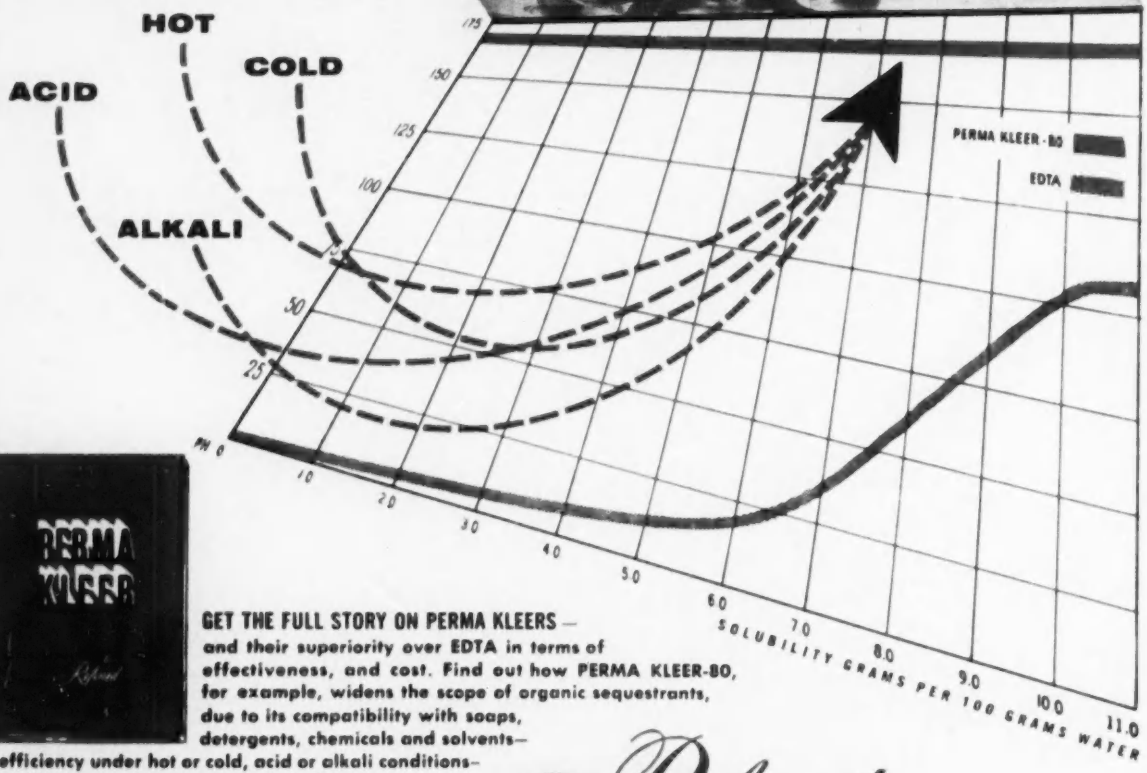

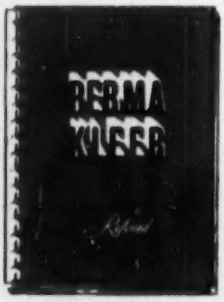

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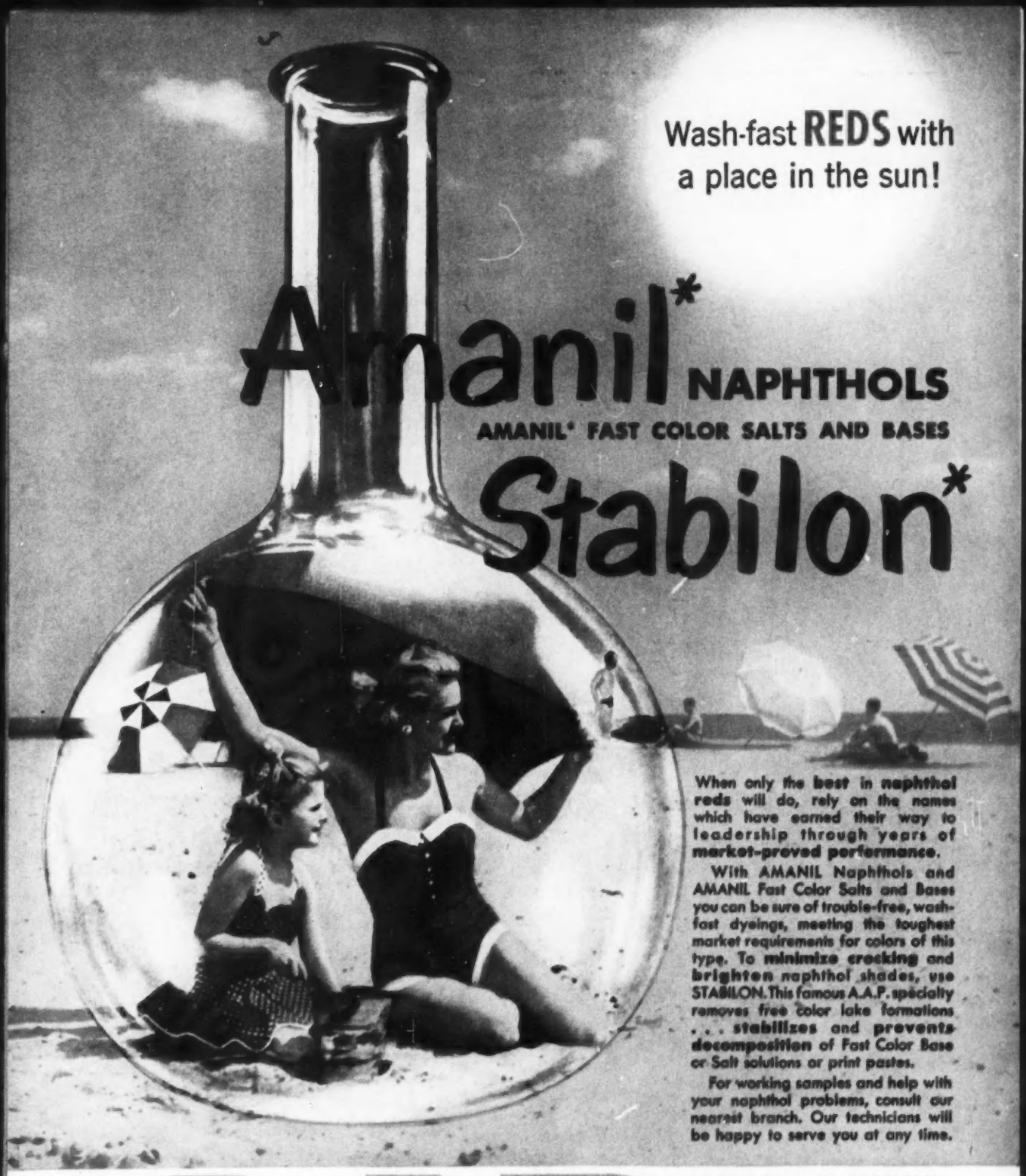

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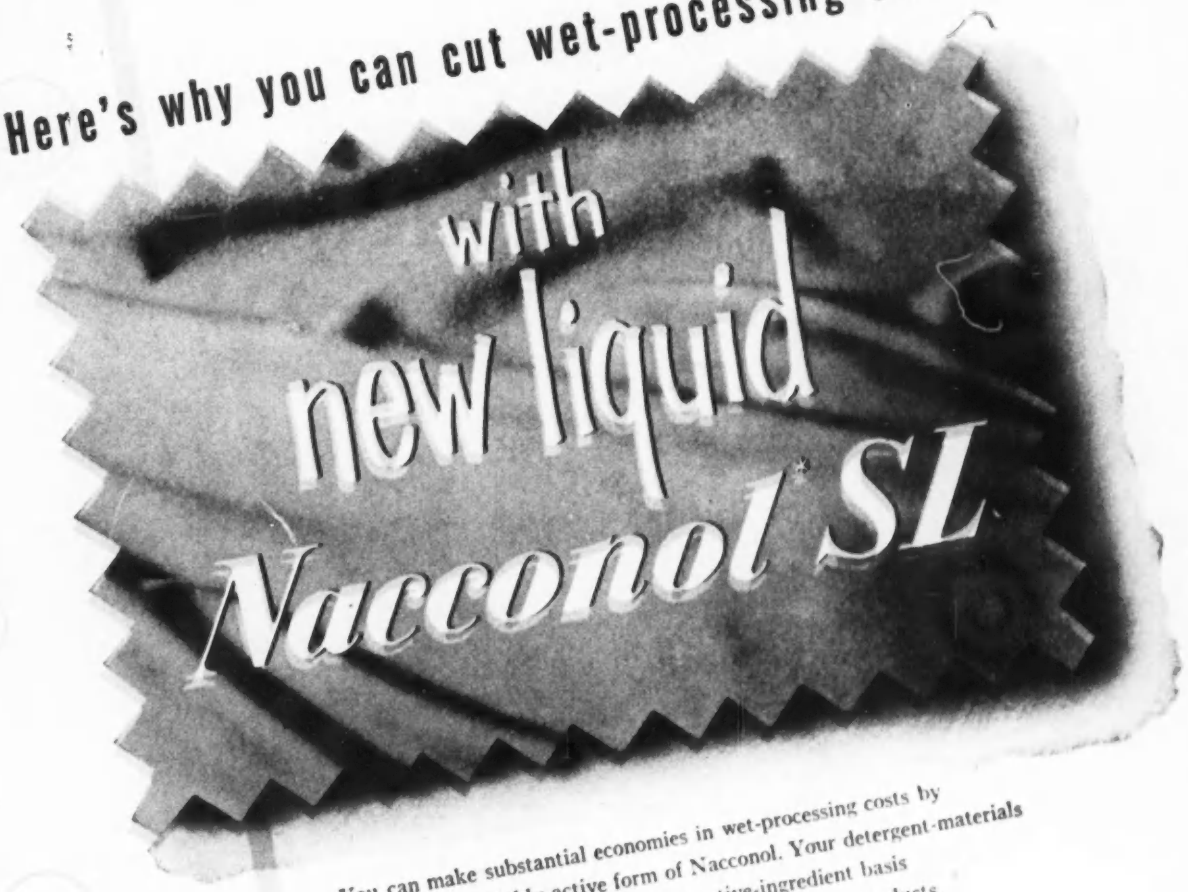

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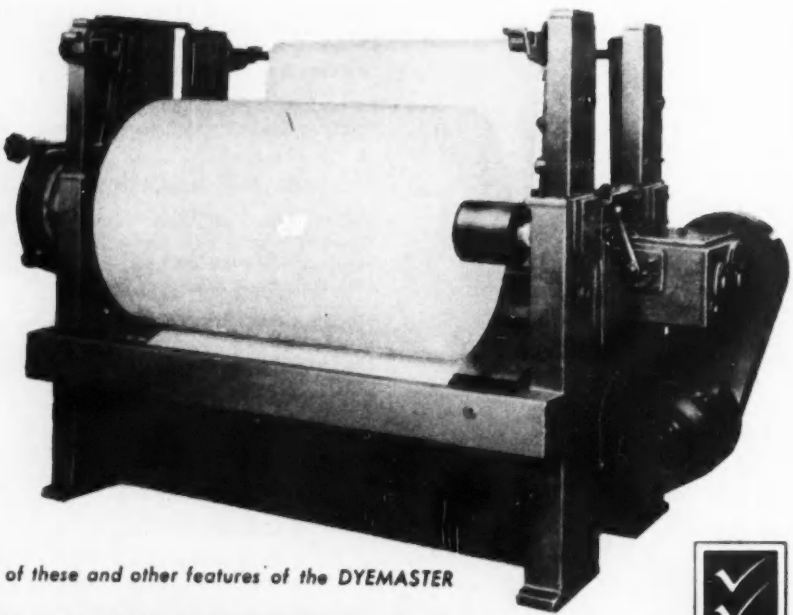

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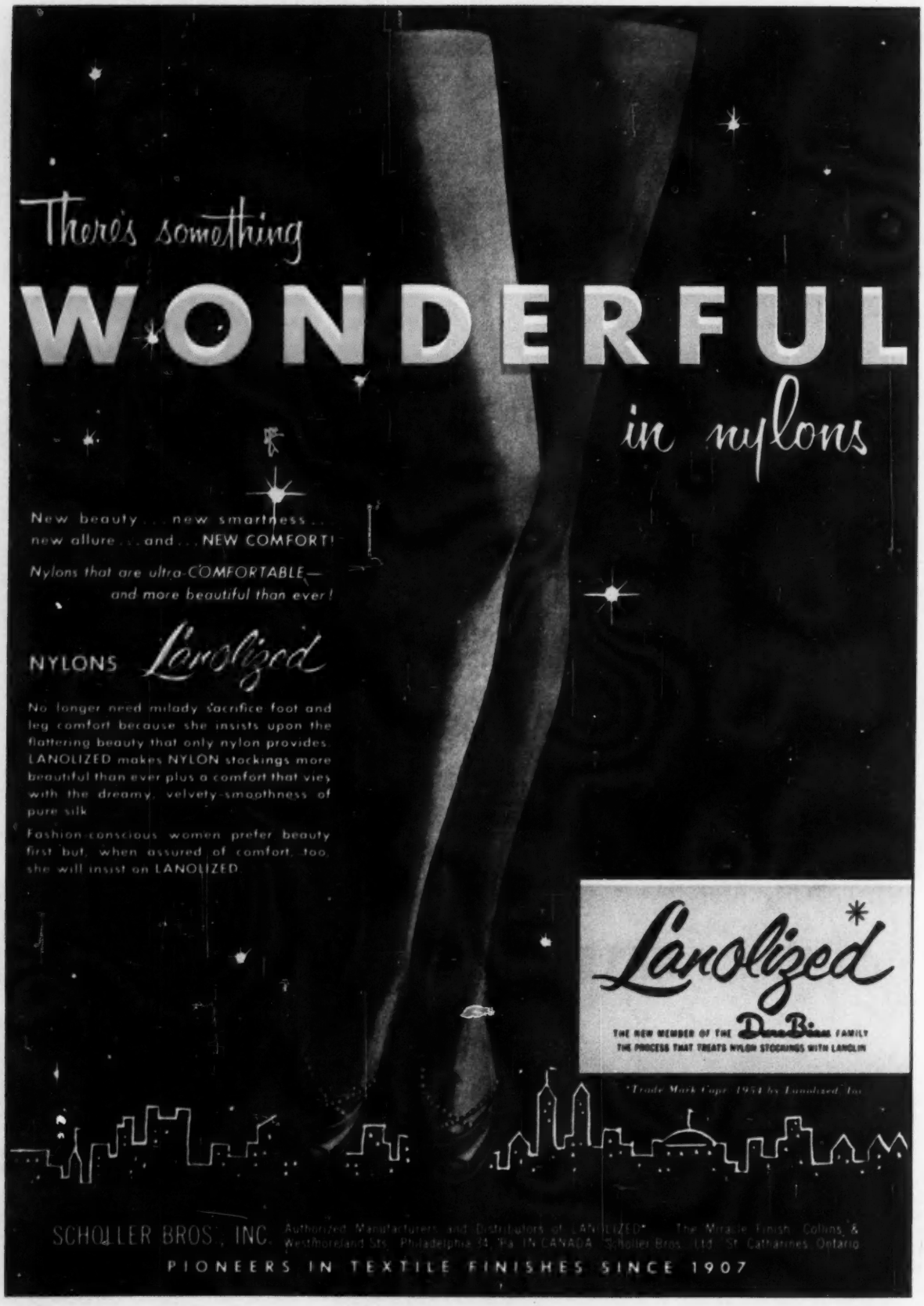
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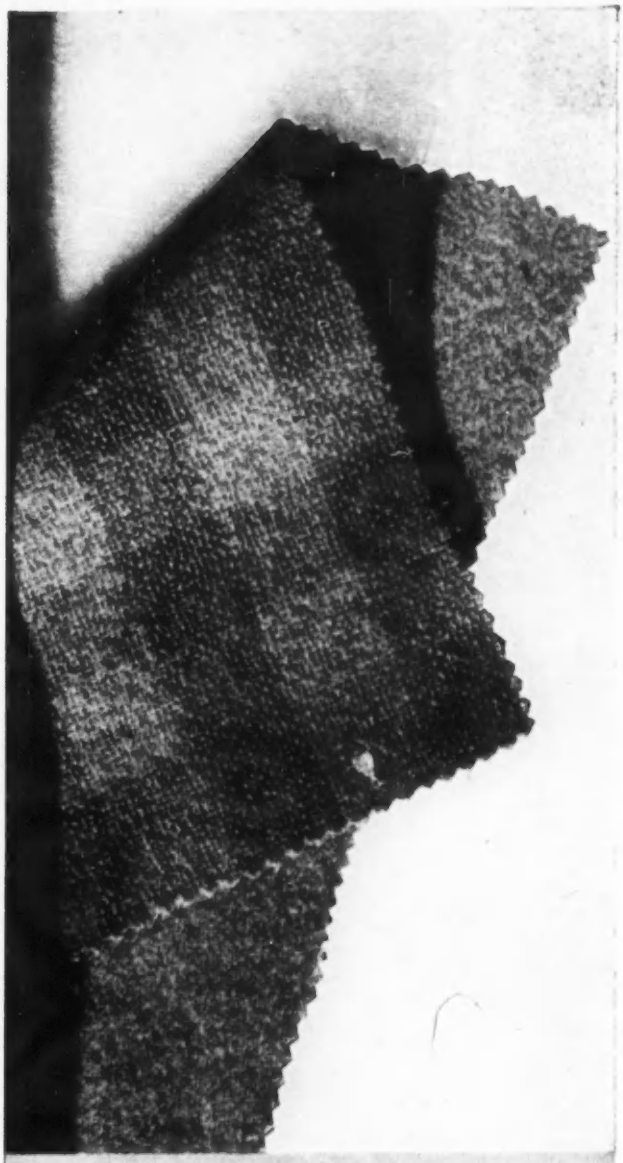

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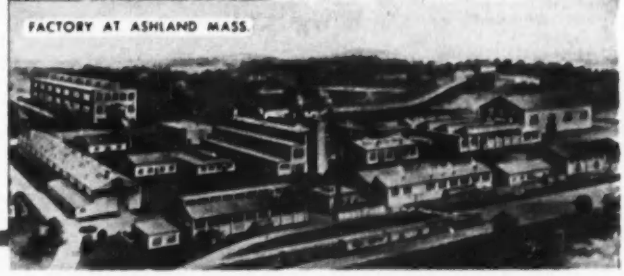

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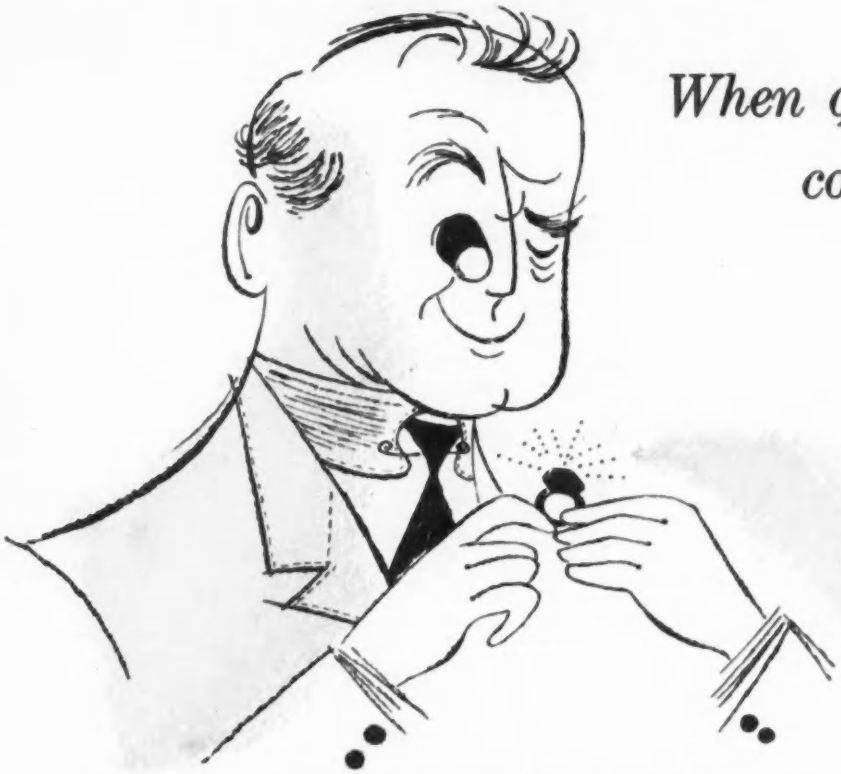

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AMERICAN

DYESTUFF REPORTER

Devoted to Textile Chemistry
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VOLUME 44 JANUARY 31, 1955 NUMBER 3

SOME DESIGN FEATURES OF A PILOT PLANT CONTINUOUS RANGE FOR CHEMICAL TREATMENT OF COTTON YARN AND FABRICS*

ESMOND J KEATING, ALBERT S COOPER, ALTON L MURPHY and HERBERT O SMITH[1]

Southern Regional Research Laboratory[2]

A group of basic textile finishing units, in a flexible arrangement that can be modified to handle various finishing treatments suggested by laboratory research, has been assembled to form a continuous chemical processing range of pilot plant size. The machine, approximately 32 feet by 4 feet overall, consists of five combination padder-washer units, a hot air dryer, and a batcher, all of 20-inch face width. The five combination padder-washer units are identical, each consisting of a three-roll padder in the center and a washer section on each end. This unusual arrangement of the 3 sections provides numerous variations in the manner of utilizing or threading each unit. The batcher consists of a draw roll, split rods, expansion comb, and a slip clutch take-up shaft. Either wooden shells for fabric or adjustable head beams for yarn may be used on the take-up shaft.

Utility of the machine is illustrated by its adaptation to the partial acetylation of cotton. Necessary additions were a cooling cylinder, feed tanks, and an exhaust hood. Data obtained with the machine were used to design a commercial continuous acetylation range which is now in successful operation.

INTRODUCTION

A CONTINUOUS chemical processing range of pilot plant size, designed for the treatment of both yarn and fabric, has been in use for several years in the Cotton Chemical Processing Section at the Southern Regional Research Laboratory. Some of the design features of this machine are the subject of this paper.

Since the Cotton Chemical Processing Section is engaged in chemical finishing research on cotton, it was desirable to have in the pilot plant a continuous processing machine for developing chemical treatments on a semi-commercial basis. There being only a few basic textile finishing machines adaptable to continuous processing, the problem was to arrange these basic units into a suitable and flexible machine. The basic units decided upon were the padder, the open-width washer, the dryer and the batcher or take-up.

Service requirements given special consideration were: ease of threading, acid and alkali corrosion resistance, limitations on the space available for installation, variable speed, services to be supplied, and ease of maintenance and repairs.

CONSTRUCTION FEATURES

The machine that evolved (Fig 1) is approximately 32 feet long by 4 feet wide overall, and consists of five combination padder-washer units, a hot air dryer and a batcher, all of 20-inch face width. Each unit and the batcher is driven by an AC

* Presented at the regional meeting of the American Society of Mechanical Engineers, Textile Division, Atlanta, Georgia, February 5, 1954.

[1] Present address: Karnes City, Texas.

[2] One of the laboratories of the Southern Utilization Research Branch, Agricultural Research Service, U S Department of Agriculture.

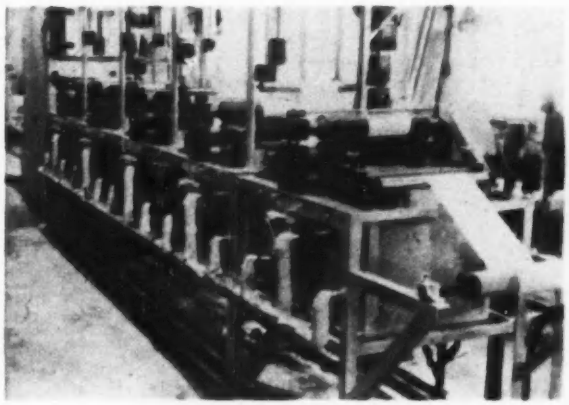

Figure 1
Overall view of machine from entering end

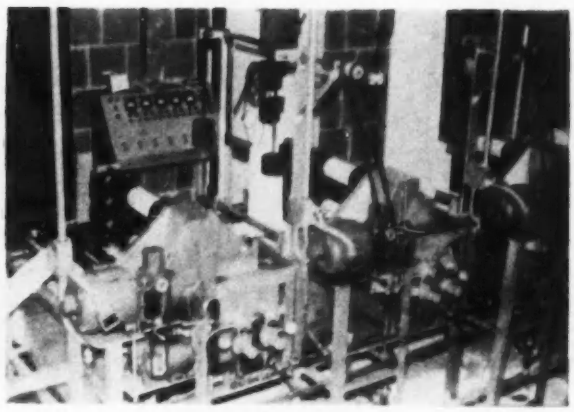

Figure 2
First three padder-washer units showing individual drive motors, compensators and console control panel

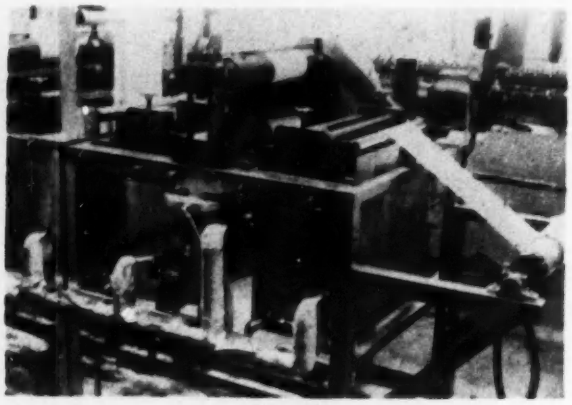

Figure 3
One of the five combination padder-washer units

motor, through a variable speed changer of the cone and ring type, having an overall speed range of 3 to 20 yards per minute. The speed changer is actuated, on the first unit, by a small gearhead AC motor and on each succeeding unit by a dancer roll or compensator that is directly connected by chain and sprocket to the speed changing shaft, as shown in Fig 2. The same photograph shows the console type control panel which includes appropriate protection for the electrical system; a speed indicating meter for each unit; trouble lights that indicate which compensator roll has reached its upper or lower limit, thereby stopping the whole machine; push buttons for changing the speed of the lead unit and a master on-off push button for the whole machine as well as one for the drive motor of each unit. Push button stations at each end also start and stop the machine as a whole.

The five combination padder-washer units are identical (Fig 3), each consisting of a padder in the center and a washer section on either end. The padder is of the three-roll type, each roll being rubber covered and four inches in diameter. Phenolic laminate blocks, which slide on stainless steel rods, support the squeeze-roll bearings. The top and bottom rolls have self-aligning needle bearings while the middle roll turns in a graphite impregnated, phenolic laminate bushing pressed into the block. The top roll is the fixed roll, and the middle and bottom rolls slide up when force is applied by air cylinders mounted directly below the bearing blocks. Gravity separates the rolls when the air pressure is released.

The padder immersion rolls (Fig 4) are stainless steel, two inches in diameter. They rotate in phenolic laminate bearings, fastened to stainless steel angles, the latter being supported by stainless steel rods. Since these rolls are not directly connected to the padder tank, it can be removed from below to facilitate leveling and threading and also cleaning while the machine is still threaded with yarn or fabric. The stainless steel tank is approximately six inches deep, and has a closed steam coil and a drain connection in the bottom.

The two washer sections are identical, each having three immersion rolls and four top rolls, all 2 inches in diameter. The three stainless steel immersion rolls have the same type phenolic laminate bearings and frame support as the padder section. The four top rolls also rotate in phenolic laminate bearings, the bearing blocks (Fig 5) supporting the two center rolls being so constructed that two squeeze rolls can be installed to provide a light squeeze, if necessary. The two center rolls and the additional squeeze rolls are rubber covered while the other two top rolls are stainless steel. Three of the four top rolls have extended shafts on the motor side of the unit, and each is equipped with a slip clutch sprocket, driven by chain from the top padder roll. The stainless steel washer tanks are eighteen inches deep and, like the pad box, are removable from below without disturbing the immersion rolls. These tanks also contain closed steam coils, and have drain, water inlet and overflow connections.

The flexibility of the arrangement of the three sections of each unit may be noted in the schematic drawing of one unit (Fig 6). This illustrates two of the numerous variations in the manner in which a unit can be threaded. The solid lines indicate the path of yarn or fabric if *different* liquids are used in each section, the material receiving a squeeze after emerging from each tank. The dotted lines indicate the path, if the *same* liquid is used in all three sections, the bottom nip of the pad being by-passed and the top nip utilized after the material leaves the last wash tank.

The hot air dryer shown in Fig 7 was constructed in the Laboratory's shops. It is approximately four feet long by two and one-half feet wide by nine feet high and will hold about fourteen yards of material. It consists of an angle iron frame to which are fastened insulated panels and doors. The latter are built up of 2 x 4 frames covered on the outside with plywood, and on the inside with galvanized sheet metal. A fibrous insulating material was used to fill the spaces between the plywood and sheet metal. The heating unit, a common unit space heater, is suspended from the frame and supplied with high-pressure steam. The motor which drives the propeller fan is mounted on top of the dryer away from the heated air. A sheet metal baffle divides the inside into two sections, the drying area and a return passage for recirculating the air through the heater. The guide rolls, of which there are eight

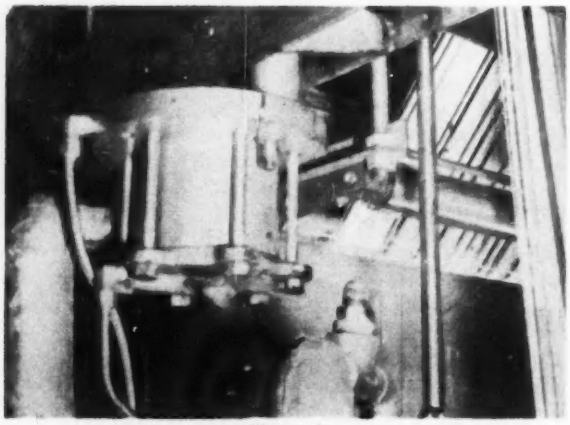

Figure 4
Padder immersion rolls and air cylinder, as seen from below

inside the dryer, are over-driven by a slip belt from the motor on the fifth unit. This alleviates tension on the material being dried. An automatic controller and steam valve regulate the temperature of the heated air.

The final unit of the machine, also shown in Fig 7, is the batcher. It consists of a draw roll which helps pull the materials through the dryer, split rods, an expansion comb, and a slip clutch take-up shaft. Either wooden shells for fabric or beams with adjustable heads for yarn may be used on the take-up shaft.

A novel feature of the machine is the use of a thin, soft rubber covering on the squeeze rolls *(1)*. The theory behind the use of this thin, soft covering is that, when force is applied to the rolls, the thin cover can deflect or flatten only slightly, thereby providing a small area of contact between the rolls, upon which area the force is concentrated. At the same time, the high pressure thus created operates together with the soft covering material to cause it to deform into the interstices in the weave of the fabrics, and around the fibers and yarns. This deformation displaces liquids that would normally pass through a nip covered with a harder rubber and therefore a higher degree of extraction is obtained. The commercial feasibility of such squeeze rolls for normal high-speed textile operation has not been proven, but one commercial application is known which will be described below.

APPLICATION

The utility of the machine is best illustrated by describing some of the modifications that were made to adapt it to the partial acetylation process for the chemical modification of cotton *(2, 3, 4)*.

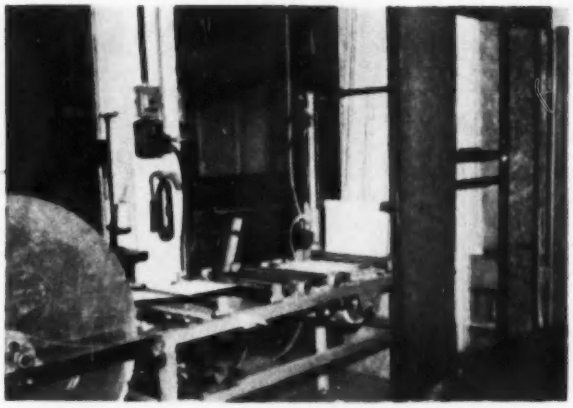

Figure 7

Hot-air dryer (right) with doors open; batcher (left) with yarn beam on take-up shaft

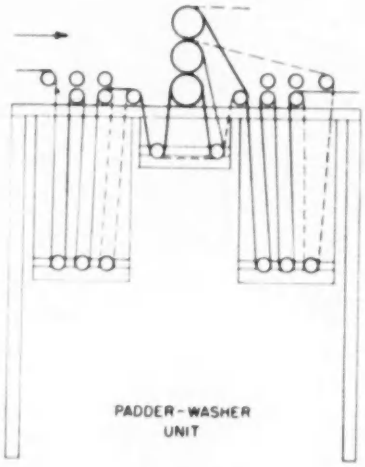

Figure 6

Schematic drawing of one padder-washer unit

This process, which converts cotton to a new fiber having improved heat, rot, and acid resistance, consists of five major steps, namely: presoaking or activation at 180 to 190°F for a minimum of two minutes; cooling to approximately room temperature; addition of catalyst by padding with two dips and two nips; reaction at slightly less than room temperature for at least three minutes; and finally, thorough washing, first in cold, than in hot water.

PRESOAKING——The first padder-washer unit was used for the presoaking step. The time requirement of two minutes was met by adjusting the speed of the machine to four yards per minute, since the length of material in the unit with all three sections threaded was about eight yards. The closed steam coils in the tanks provided the heat necessary for the temperature requirement.

COOLING——The first washer section of the *second* unit was suitable for the cooling step, because laboratory experiments had shown that normal evaporation of the presoaking acid from heavy yarn for one minute was sufficient to cool the material to approximately room temperature. However, subsequent treatment of light fabrics indicated that one minute evaporation in the open wash tank was excessive, so a cooling can was installed above the second washer of the first unit and the previously used wash tank was by-passed.

CATALYST ADDITION——The padder section of the second unit fitted the requirements of the catalyst addition step for the heavier yarn, but subsequent processing of light fabrics required a tank which would hold a smaller volume of solution and the original tank was replaced.

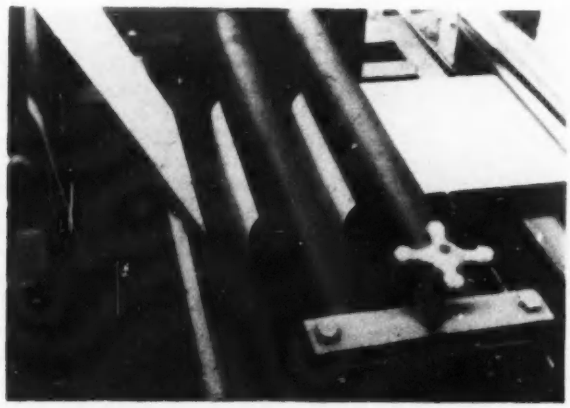

Figure 5

Top view of washer section, showing auxiliary squeeze rolls

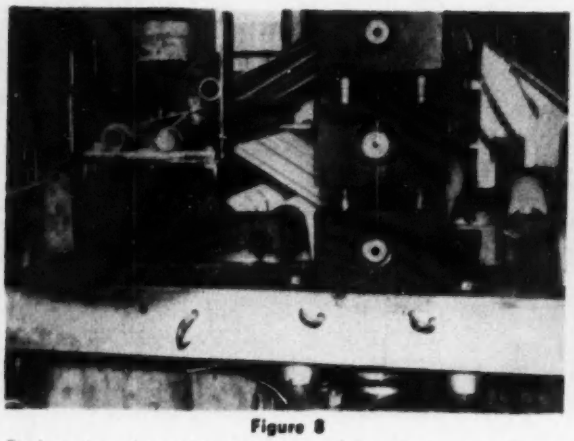

Figure 8

Final section of reaction step of acetylation process showing yarn passing over free squeeze roll and downward to large squeeze rolls, also pan in padder tank

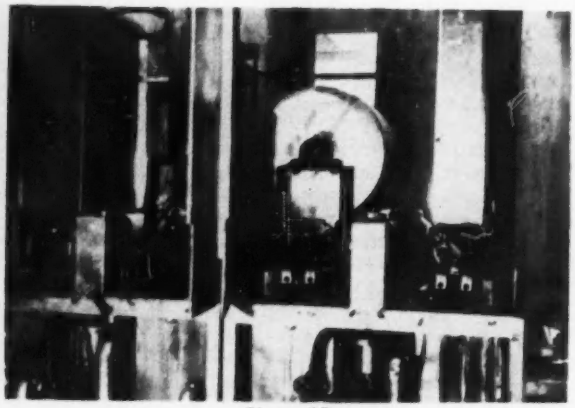

Figure 10

First two padder-washer units, showing feed tanks and cooling can

REACTION——In addition to the time and temperature, a number of other special requirements necessitated modification of the basic units for the reaction step:

1) One and one-half units were necessary at four yards per minute to provide the three minute reaction time. The second washer section of number two unit and the whole of the third unit were just what was needed, except that the padder squeeze rolls were not utilized until the material emerged from the last tank.

2) A definite volume of solution had to be continuously removed from the bath in order to maintain the necessary concentration. Since the material leaving the bath would have a normal saturated take-up approximately equal to the volume of solution required to be removed, the problem was to prevent the excess solution at the squeeze rolls from re-entering the bath. This could happen in two ways: by drippings from the squeeze rolls falling on the material passing through the padder tank, and by the solution running back down the material and hence into the last tank. The problem was solved (Fig 8) by installing one of the small squeeze rolls, above but free of the top guide rolls of the last tank, so that the material passed over this roll and then downward to the squeeze rolls. Also, a pan was placed under the squeeze rolls in the padder tank so that the drippings drained to the side without contacting the material passing through.

3) In order that a constant level and uniform temperature and circulation might be maintained the three large tanks which constituted the reaction step were, in effect, made into one by connecting them with one- and one-half inch pipe at the bottom.

4) A centrifugal pump and a double pipe heat exchanger were installed on the motor side of the machine to provide the necessary circulation and refrigeration.

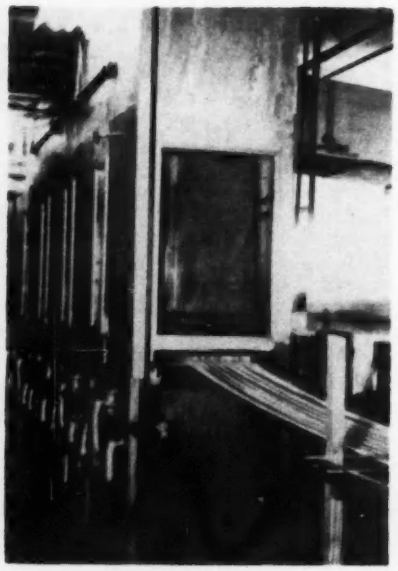

Figure 9

Entering end of machine with hood installed

WASHING——The fourth and fifth units were devoted to washing, with additional overflow drains and sprays added to increase the washing efficiency.

The machine is completely hooded as shown in Fig 9. This was necessary because of the irritating properties of the chemicals used in the partial acetylation process. The hood and ducts are constructed of plywood and two metal window fans provide adequate draft. The large tanks shown inside the hood above the first and second units are feed tanks for the presoak, catalyst, and reaction steps of the process (Fig 10).

The heavy yarn referred to previously was run in ball warp form, ranging from 480 ends of 14/2 and 18/2 ply to 188 ends of 7/3 and 8/5 ply. Current trials are being made on 8/7 ply yarn, in sheet form, pulling from a creel and batching on a beam, 6 oz crash toweling and osnaburg, and 2 oz, 4 oz, and 6 oz print cloth and sheeting have been processed with success.

Data obtained from this machine were used to design a commercial size continuous acetylation range, employing standard sixty-inch face open width washers and a padder, slightly modified to meet the process requirements. The squeeze rolls on this range incorporate the principle of thin, soft rubber coverings described previously, and although it is a relatively slow speed process, they are performing very satisfactorily.

Up to the present time, the pilot plant continuous machine has been used only for the partial acetylation process and probably will be for some time to come, but if this process is an example of future use, the machine should prove to be the versatile accessory to the cotton research program that was originally visualized.

ACKNOWLEDGMENTS

The writers are indebted to other members of the Cotton Chemical Processing Section for their contributions; thanks are also due to members of the Mechanical Service Shops for their helpful suggestions during installation of the machine.

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(4) Buras, E M, Jr, Cooper, A S, Jr, Keating, E J, and Goldthwait, C F, *Am Dyestuff Reptr* 43, P203-P208 (1954).

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JANUARY 31, 1955

AATCC CALENDAR

(A general calendar of events may be found on page 96)

COUNCIL
Jan 21 (Hotel Statler, New York); Apr 29 (Hotel Dennis, Atlantic City, N J); June 17; Sept 22; Nov 18; Jan 20, 1956; Apr 20, 1956; June 15, 1956.

NATIONAL CONVENTIONS
Sept 22-25, 1955 (Chalfonte-Haddon Hall, Atlantic City, N J; 1956 (Waldorf-Astoria, New York); 1957 (Boston); 1958 (Chicago); 1959 (Washington, DC—tentative).

HUDSON-MOHAWK SECTION
Feb 25, Apr 15 (Jack's Restaurant, Albany, N Y); May 20 (Ladies Night); June 24 (Annual Outing).

MID-WEST SECTION
Feb. 12 (Bismarck Hotel, Chicago, Ill); Apr 16 (Netherlands Plaza, Cincinnati, O); June 11 (Lake Lawn Lodge, Delavan, Wis).

NIAGARA FRONTIER SECTION
Mar 4 (Hamilton, Ont); April 22 (Buffalo); June 24 (Outing).

NEW YORK SECTION
February 25 (Skytop, Hotel Statler, New York); March 18, April 22, May 20 (Kohler's Swiss Chalet, Rochelle Park, N J).

PHILADELPHIA SECTION
Mar 4 (Penn-Sherwood Hotel, Philadelphia); Apr 15 (Kugler's Restaurant, Philadelphia); May 20 (Outing———Manufacturer's Golf & Country Club, Oreland, Pa); Oct 21 (Penn Sherwood Hotel); Dec 2, Jan 13 (Kugler's Restaurant).

PIEDMONT SECTION
Apr 30 (Robert E Lee Hotel, Winston-Salem, N C); June 10-11 (Mayview Manor, Blowing Rock, N C); Oct 29 (Hotel Wm R Barringer, Charlotte, N C).

SOUTHEASTERN SECTION
Feb 12 (Alabama Power Co and Pureloy Hotel, Talladega, Ala); Apr 23 (American Legion Club, Lindale, Ga); June 3-4 (Annual Outing, Radium Springs, Ga); Sept 10 (Ralston Hotel, Columbus, Ga); Dec 3 (Atlanta Biltmore, Atlanta, Ga).

WASHINGTON SECTION
Feb 11 (Washington); May 20

WESTERN NEW ENGLAND SECTION
Mar 18 (Rapp's Restaurant, Shelton, Conn); May 13 (Ladies Night); June 17 (Annual Outing); Sept 16 (Rapp's); Nov 4 (Hartford, Conn); Dec 16 (Rapp's)

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the Secretary.

ACTIVITIES OF THE LOCAL SECTIONS

PHILADELPHIA———The Educational Committee of the Philadelphia Section has announced a series of sessions on "The Theories of Dyeing." Eight two-hour classes will be given by men prominent in the textile wet-processing industry beginning Monday, Feb 7, 7:30 pm at the Philadelphia Textile Institute and continuing on the following seven Mondays as follows:

Feb 7 — General Survey of Dyeing Processes
Feb 14 — Colloidal Properties of Dye Solutions
Feb 21 — Dyeing Equilibria
Feb 28 — Cellulose Dyeing
Mar 7 — Dyeing of Cellulose Acetate
Mar 14 — Dyeing of Proteins
Mar 21 — Absorption of Dyes by Wool
Mar 28 — The Dyeing of Polyamide Fibers

* * * * * *

WASHINGTON———The Washington Section will meet at the Occidental Restaurant, 1411 Pennsylvania Ave, N W, Washington, D C, on Feb 11th. Theodore F Cooke, manager, Textile Resin Laboratory, Bound Brook, N J, will discuss "The Mechanics of Wrinkle-Resistant Finishes for Cellulosic Fabrics."

* * * * * *

WESTERN NEW ENGLAND SECTION OFFICERS — 1955

Seated (l to r): Thomas J Gillick, Jr, American Felt Co, treasurer; Socrates V Vaniotis, National Aniline Div, chairman; Nathaniel J Clade, American Cyanamid Co, secretary.
Standing (l to r): John E Hinn, National Aniline Div, vice chairman; Andrew W Goodwin, Princeton Knitting Mills, Inc, sectional committeeman; Paul W Reeves, Princeton Knitting Mills, Inc, sectional committeeman; Rudolph C Geering, Princeton Knitting Mills, Inc, councilor.
Not present when photo was taken were sectional committeemen A H Rant and A N De Marco, Shelton Hosiery Mills, Inc.

(Photos taken at recent Western New England Section meetings appear on page P86

TEXTILES' FIGHT FOR THE CONSUMER DOLLAR*

J GORDON DAKINS

Executive Vice Presient and Treasurer
National Retail Dry Goods Association

A man interested primarily in promoting the sales of textiles gives an inspiring address on what the textile industry must do to get its share of the consumer dollar, especially now that the ultimate buyer of textiles can make a choice in purchases beyond dire necessities. Of greatest immediate interest to textile chemists in his call for greater cooperation in the voluntary promulgation of pretesting methods and in the use of the results in informative labeling. He also proposes the formation of a committee with members from the National Retail Dry Goods Association and all parts of the production end of the textile industry for the study of mutual problems.

PERHAPS the title of my talk "Textiles' Fight For the Consumer Dollar" is a misnomer. In my book a fight implies ill will. It implies, too, the possibility of defeat. I would hate to believe for one moment that any of us here are defeatists. The very fact that we are here is proof enough that we have confidence in our ability to forge ahead, to face the future with vigor, to attain new heights of achievement. The will to succeed — to do things better — is part of the American Way. It is responsible for America's position of leadership. It will be responsible for maintaining and even increasing our prosperity.

No road to success, however, is without its stumbling blocks. Your great industry and mine have had their share. Some we are facing today. Others we have encountered have perhaps slowed our road ahead, but not stopped us. They have constituted a challenge, which we as American businessmen have accepted as part of the life we lead.

Today retailing, which I represent, and the textile industry have many mutual problems. They are not insurmountable. Instead, as we meet and conquer them, we gain new strength, which adds to our stature and our efficient enterprise.

I hope that I am not giving you the idea that success is ours without effort. I do not believe that to be so. Yet, there is no reason to think that we have come to the end of the road. Rather, we are in an era which requires us, as individuals, to exert ourselves beyond our accustomed efforts.

Al Smith used to say, "Let's Look at the Record." The Record for us is history. It's the future that offers opportunity. So, let's examine the signs on our present horizons. Let's Look At the Future, in the light of current events.

For our purposes, the future is directly allied to the consumer, and specifically the consumer dollar. Nothing happens in your factories, in your dye plants, in your showrooms and in the stores that sell your merchandise until some customer steps up to a retail counter and speaks the magic words, "I'll take it." When she says them, she turns the key that opens the door of farms, factories, and retail establishments across the country. With that simple statement she sets the wheels of production and distribution in motion, creating employment, increasing national income, and adding to the wealth of our economy.

In the normal course of events she can be expected to buy what she needs. She may even go further and buy in small degree more than mere necessities. For she is the typical American Consumer. She is accustomed to a high standard of living. She expects the best. She deserves the best. As the typical American customer, she looks to you and me for guidance in terms of what to buy and even how much to buy. She is by nature a careful shopper, searching out the merchandise that will add to her own comfort and the comfort of her family. With that objective she wants our assistance, and the assurance that the money she spends is well spent. Further, she is vitally interested in new developments that will add to her well being. She wants to know what is new in design, in fashion, and she expects to be told.

In other words, the American Customer of 1955 is "Open to Buy." But, buy she will not, until we take every action at our command to stimulate her desire for goods. If we fail to do so, then only we are to blame when our share of the consumer dollar falls.

Certainly it is no secret that, percentagewise, the textile industry is not realizing its potential of customer-dollar sales. Readily available figures indicate that, in spite of increased consumer spending, the amount of each dollar spent for textiles has dropped.

I'm not here to discuss the symptoms with you. I think, however, that my own experience and close connection with the stores that sell your merchandise give me an insight which may point the way to a cure. Before prescribing the medicine, however, any good doctor will spell out the possibilities for good health. That's what I intend to do now, and they are excellent.

Together with all other phases of business, the textile industry is witness to a changing and rapidly expanding American market. Numerous factors are present in the economy which cry out OPPORTUNITY in capital letters. BUT — and that too is in capital letters — the OPPORTUNITIES present a challenge. If we accept the challenge, the OPPORTUNITIES will open the door to achievement.

OPPORTUNITY number one is evident in the steadily growing number of customers within our land. Population growth in the United States since 1940 has confounded even experts. In 1952 the Census Bureau made estimates of the population in 1955 and in 1960. The 1955 estimate has already been surpassed, and the estimate for 1960 indicates a minimum population of over 171 million people. This enormous increase in the number of men, women and children — almost 30 millions in twenty years — is of extreme significance to you as producers of a basic commodity. It poses for you a number of questions. Yet the answers to each must mean increased opportunity for sales. Among the questions you should ask yourself are, "What are the effects of this enormous population boom upon the textile market? What are the effects of the wave-like expanding birth rate since 1943? What is the effect of the increase of older age groups, because of better standards of living and medical advances?"

Opportunity number two has been highlighted in a recent issue of *Fortune Magazine*, which stresses that the "Chang-

* Presented at the Luncheon Session of an all-day AATCC Symposium held on Wednesday, May 19, 1954, at the Hotel Statler in New York, with Leonard S Little presiding.

ing American Market" is creating a one-class prosperous middle-income customer. *Fortune* estimates a total of 51 million family units, 40 percent more than in 1929. But this same number of units now enjoys an annual income of $220 billions, 94 percent more than twenty-five years ago. What does this mean to you? Are your promotional tools, your styling, your planning geared to appeal to this new type of customer?

Opportunity number three is the spending power of this middle-income buyer. Thirty-five percent of our total population is now in the $4,000 to $7,500 range. Yes, 18 million families in these United States will this year receive 93 billion dollars, or 42 percent of our total national income. This reflects a national increase of 66 percent in real purchasing power since 1940, in spite of increased taxes and higher prices.

What are you doing to get your share of this growing ability of people to buy? Are you designing your products in styles, fashions and colors which will appeal to this mass market? Or are you waiting for the business to come to you?

Opportunity number four is what has been termed "discretionary spending power." With increased income, people are afforded two courses of action. They can save or they can buy. Arno Johnson, research director of the J Walter Thompson Company, points out that "discretionary spending power is now 4½ times its total of 1941, amounting to 51 percent of disposable income." I cannot too strongly impress upon you that these funds are available for increased savings, for more insurance or for spending.

Exactly as the term implies, their use is at the discretion of the customer. You can be certain, however, that they can be put into circulation, and, with effort on your part, they can find their way into your mills, your converting plants, and other areas of the textile industry. It is up to you to whet consumer appetites for what you produce. The same old thing, presented in the same old way, is definitely not the answer. "New" is the word that should replace the familiar "think" signs in your offices and factories. The new in fabrics, the new in style, the new in color, the new in fashion is what the American customer wants, and what you must give her if your industry is to prosper.

Yes, the market is there, and growing day by day. The big question is, "Will you take advantage of it?"

Will you devote more attention to the design of new fabrics, and the improvement of old to insure the utmost in customer appeal in style, color, and fashion? If your answer is "yes", then you are on the right track.

Will you concentrate on control of quality in every piece of merchandise you offer for sale? If your answer is "yes", then you've taken a step to win and hold customer confidence, respect, and, even most important, customer purchases of your product.

In view of my connection with retailing, I hope you will bear with me if I amplify my comment on the need for attention to control of quality. It would be folly for you or me to think for an instant that Mr and Mrs American Consumer are not prudent buyers. They have been educated almost from birth to want and get the best in every type of merchandise. The best to them means style, fashion and design, certainly. But it means, as well, an adherence to standards of performance which satisfy in wearability too. The value of a dress, a curtain, a blouse, a shirt, a slipcover or any other item is no greater than the value its component parts deliver to the customer.

Good will must be earned. Ill will comes easily. And we will get and, if I may say so, deserve customer ill will, if the performance of the merchandise we offer her does not come up to her expectations.

Style and fashion, yes. But style and fashion without performance, no. I certainly don't have to tell you that performance related to textiles covers a variety of features. What can be more discouraging to a shopper, than the failure of an article bought with confidence to meet expectations in wear? What can lead faster to consumer distrust and ill will than disappointment in a purchase made with trust in a store and its merchandise? What faster method is there to lose customers and lose sales volume, than to gain consumer antipathy?

Widely diversified from the raw product to the retailer's counter, the textile industry is particularly vulnerable to customer claims of poor performance. In the path from yarn producer to the mill and then to the converter and dyer, store and customer, there exists a myriad of pitfalls, tempting expense-conscious management, but spelling out poor performance of the final end product. These pitfalls multiply at the manufacturer level, and I would be burying my head in the sand, if I told you they were nonexistent in retail stores.

To overcome them every segment of your industry and every retailer must bear in mind that the consumer is the boss. Poor performance because of shrinking, fading, lack of durability, poor styling, the wrong fabric for a specific end use, and other performance factors which you so well know breed consumer discontent. Consumer discontent in turn breeds lost sales.

If every producer, converter, dyer, manufacturer and retailer would keep customer satisfaction as the paramount issue in his business life, our major problem would be solved. It is the seemingly unconquerable desire to chisel a penny here and chisel a penny there that has fathered a large part of textiles' current difficulties.

It is not possible or feasible to single out one segment of the trade and, pointing the finger, say, "You are at fault." The fault lies with us all. The combined efforts and co-operation of all of us are needed to correct it. Let this be the failure of one link in the chain, and our whole effort is lost.

The best fabric is no better than the yarn from which it is made. The best fabric is at the mercy of the converter. Or, its future can be ruined by the choice of cheap dyes. Sometimes fabrics, converted with quality and quality dyed, often find their Waterloo on the cutting tables and sewing machines of the manufacturer.

At the retail level, too, there exists in numerous instances the pressure of competition upon buyers and merchandisers, which may result in a sacrifice of quality on the retail counter. In such cases we are to blame for our failure to adhere to quality and performance standards, which together with style are vital to customer confidence and produce the increased sales which are our common goal.

Of all the factors that deserve our attention, probably the most important to the customer, and therefore to us, are performance standards. We cannot expect our customers to look with continuing favor upon us as individual producers or retailers, if the performance of the merchandise we sell belies our claims. Certainly we are all aware of recommendations for the establishment of trade-wide pretesting methods devoted to consumer satisfaction in end-use. The subject has been aired and discussed at length, but, unfortunately for us and our customers, we have not made the strides to date that could be expected of our respective industries.

To question "why" is not my intent. The need is there. It is there for every segment of the industry, from the yarn producer to the retail buyer. We all recognize that it is ever present and ever important to our own interests. We all know that to a major degree any customer dissatisfaction comes from disappointment in merchandise bought with attention to style and even quality which fails to measure up in use. We know, too, that we can take the steps, and even have at our disposal the means to meet a situation which is detrimental to our interests and those of our customers. If there is a "why", it should be in a sentence, "Why

have we not taken action as a group?" Why have we not joined forces to develop co-operatively a pretesting formula in which every segment of the trade will participate, and I include the retail buyer and merchandiser? If there is a "why", it should perhaps be, "Why are we evading the issue?" Are we distrustful of one another? Are we too jealous of our own prerogatives to jointly hunt out and cure the cancer that is affecting us one and all?

If such be the case, then we had better examine our own consciences. We had better say to ourselves and even to our competition that what is good for customers is good for our industry, and what is good for industry is good for ourselves.

At this very moment, the National Retail Dry Goods Association is sponsoring the promulgation of end-use standards by the American Standards Association. When issued, these ASA Standards will constitute a yardstick of performance values for yarn producers, mills, converters, dyers, manufacturers and retailers. Our co-operation is needed on an industry-wide basis. To fail to co-operate in this vital effort or in the resulting ASA Standards is to fail to recognize our responsibilities to the American consumer and the textile industry itself.

These, of course, are voluntary standards. As such, they offer the chance for voluntary participation by every segment of the craft. If they are good, and they will be good, then they deserve our voluntary participation. If we pay them only lip service, we cannot later complain, should we suddenly find ourselves forced to adhere to standards established by outside agencies.

And speaking of the word voluntary, I would like to say just a word or two on labeling. Again, it is the consumer I ask you to consider. She is entitled to merchandise identification, which will lead to its best serviceability. She is entitled to know what she is buying, and what she can do with merchandise once she has bought it. Let's tell her. Let's voluntarily and clearly identify the contents of the fabrics in an item. Let's clearly and briefly state what it will do, and what can't be done to it. And, on the retail level, let's make certain that merchandisers and buyers inform their salespeople accurately about every textile they sell, and about the performance data of textiles in merchandise they offer for sale. In other words, the chain of information on performance must be as complete as our own adherence to quality.

With the objective of a strong, profitable textile industry operating in close co-operation with the retail stores, in which its products are sold, I would like to offer a recommendation, which we at the NRDGA hope will meet with your favor and subsequent action. The NRDGA proposes that the Textile Industry form a Committee, representing all phases of the industry, to work with its Technical Committee of the NRDGA in a joint effort devoted to the mutual interests of textiles and retail stores.

We foresee in such a joint endeavor the opportunity to meet on common ground and to find the solution to common problems affecting your industry and the retail trade. We foresee beyond this the opportunity to examine jointly the areas of mutual activity which would open new horizons in the manufacture and distribution of textiles in all their phases. We picture the efforts and recommendations of such a Committee as a new and vital force in developing new fields for greater textile volume and a revitalized consumer interest in textiles and textile products.

I can assure you that the Chairman of our Technical Committee, Charles Dorn of the J C Penney Company, and the leading retailers who are its members would welcome the opportunity to sit down with such a Committee from your industry to create jointly a program devoted to our respective interests and that of the consumers we serve.

It is the NRDGA's hope, too, that out of the work of the two Committees may result a definite policy which can be the basis for a joint meeting at our Convention next January, a meeting at which textile men and retailers can freely consider and discuss their current problems and the path that will ultimately and surely lead to their continued success.

Let's make "Textiles' Fight For The Consumer Dollar" a fight to tell the consumer and buyer how to handle textile articles in use. Let's carry the knowledge of what a product can do, from mills through all the complicated channels of distribution and production of garments, to retailers through the satisfied consumer. Let's stop dissatisfaction of the consumer from excessive shrinkage, loss of colors, or permanency of finish, and let's concentrate on how to satisfy the vast public with the craving for new and various styles.

Let's eliminate dissatisfaction that can be avoided by applying test methods for evaluation of textiles. Then let each fiber and each fabric fight for preference of the consumer on sound ground of applied sciences to which the American Association of Textile Chemists and Colorists contributes so greatly!

MEMBERSHIP APPLICATIONS

December 30, 1954

SENIOR

Vittorio Bottelli — Textile chemist & colorist, Aziende Colori Nazionali Affini, Milan, Italy. Sponsors: F Boratto, O Bizioli.

Walter Brunner — Chief chemist, Vereinigte Farbereien & Appretur AG, Zurich, Switzerland. Sponsors: W G Helmus, H Moore.

Francesco Castorino — Head of Dyeing & Finishing Dept, Duplex C A, Caracas, Venezuela. Sponsors: L Fusser, G Neisser.

Thomas J Doheny — Assistant dyer, American Skein Dyeing Co, Paterson, N J. Sponsors: L H Winnell, B J Hodes.

Seymour Garland — Dyer, Cosmo Dye Works, Brooklyn, N Y. Sponsors: A J Rooney, T Innes.

James E Greene — Hosiery dyer — men's hosiery, Mauney Hosiery Mills, Inc, Kings Mountain, N C. Sponsors: J C Steele, J W Sutton.

Hiromitsu Idogaki — Chief, Dyeing Division, Kurashiki Cotton Spinning Co, Osaka, Japan. Sponsors: L Fusser, G Neisser.

Gerard E Lindner — Lab tech — textile chemist, American & Efird Mills, Thread Plant, Mt Holly, N C. Sponsors: F Hyatt, A Veevers.

Robert P Manasse — Treasurer, Sawyer Tanning Co, Napa, Calif. Sponsors: C B Fieldhouse, I O Paulsen.

Eugene W Sack — Sales representative, Emery Industries, Inc, Cincinnati O. Sponsors: E Holt, F K Burr.

Ralph Tanasoca — Chemist (ass't dyemaster) Spinnerin Yarn Co, South Hackensack, N J. Sponsors: E E Forsher, L W Craft.

ASSOCIATE

Daniel W Kallman — Tech dir, Baird Chemical Corp, New York, N Y.

Francis P Mackinney — Southern manager, Sandoz Chemical Works, Inc. Charlotte, N C.

Kensho Murakami — Dyestuff Div, Toko Kasei Co, Ltd, Osaka, Japan.

Bertil A Winberg — Exec vice-president, Aktiebolaget Germa. Sundbyberg. Sweden.

STUDENT

James M Buckner, Jr — Georgia Institute of Technology. Sponsor: W Postman.

APPLICATION FOR TRANSFER TO SENIOR MEMBERSHIP

Robert E Newman

CORPORATE

A E Staley Mfg Co.

THE DYEING CHARACTERISTICS OF DIFFERENT WOOL GRADES*

WILLIAM F BROMMELSIEK and WERNER VON BERGEN

Forstmann Woolen Co

and

HENRY E MILLSON

Organic Chemicals Div, American Cyanamid Co

The dyeing properties of four wools were studied: an Australian Fine, a New Zealand Medium, Domestic Fine and Domestic Medium.

Dyeings conducted from pieces made from these four wools showed considerable spread in depth of shade. The analyses revealed that these shade differences are directly related to the fiber fineness. One wool-grade difference is equal to a five-percent difference in the depth of shade.

In addition to the study of the four wools in piece form, dyeing studies were also made on top as well as on individual staples.

In this study were included acid, acid metalized and chrome dyestuffs. Spectrophotometric analysis of the dye liquor during practical dyeing shows that there was no difference in the amount of total exhaustion from the dyebath between the four wools. But slight differences in rates of exhaustion were present.

Several techniques, including the use of the Microdyeometer as developed by Calco as well as microscopical studies, have been used to ascertain the causes of the actual shade difference between wool grades.

INTRODUCTION

THE study of dyestuff absorption has challenged researchers in the field of both natural and synthetic fibers. Every dyer has recognized the differences in depth of shade obtained on fibers of different diameters (grades) when the same percentage of dyestuff is applied. This holds true for all types of fibers. Vickerstaff *(1)*, in a paper presented before the Institut Textile de France in October 1950, explained the theory governing dye absorption in synthetic fibers, and made the statement regarding wool that "It has long been known from studies of natural fibers that fine filaments dye more rapidly than coarse filaments, but need more dye to appear the same depth of shade". In studies on wool dyeing the difference in depth of shade has been attributed to many causes, some of which are the origin of the wool, the breed of the sheep, the difference in cuticle thickness, the greater area which must be dyed, the light reflection from the interior of the fibers, and to ring formation in the dyeing of the coarser fibers. Von Bergen and Wakelin *(2)*, in their paper "Properties of Apparel Wools" present a comparison of manufacturing properties between wools of different diameter. Included in that study is a section, F—Dyeing and Finishing, which has been used as the basis for the work covered in this paper.

PIECE-DYEING EXPERIMENTS

FABRIC HISTORY ——— Four wools representing two fineness classifications, namely fine and medium, of both domestic and foreign sources were studied. Representing the fine wools were a merino type from Queensland, Australia, and a domestic Rambouillet from the US Sheep Experiment Station in Dubois, Idaho.

These wools were all processed on identical equipment: the same scouring train, same cards, same gills, same combs, and the same drawing, spinning (French system), and twisting frames. They were woven on the same looms, scoured in the same dolly washer, dyed in the same dyeing machine with identical procedures, shorn and steamed on the same finishing equipment. The only deviation in processing was in spinning to compensate for the difference in fineness between the wool types.

A thirteen-ounce serge fabric comprised of 2/40 worsted yarns was developed with the assurance that each fiber had received very close to identical processing.

PERTINENT PHYSICAL AND CHEMICAL PROPERTIES ——— All physical and chemical measurements were conducted on fibers removed from "top" which assured proper sampling.

Extensive single-fiber measurements conducted on the four wools revealed insignificant physical differences when account was taken of the differences in fiber size or diameter. The stress-strain curves were used as the principle means by which the physical properties were compared.

The fineness measurements, which are the critical characteristics for this study, are shown in Table I.

TABLE I

FINENESS MEASUREMENTS

Wool Type	*Average Diameter, Microns*	*US Grade*
Fine Australian	19.8	70's
Fine Domestic	21.1	64's
Medium Domestic	26.2	58's
Medium New Zealand	26.3	58's

A series of chemical analyses were made including those for amino acids, sulfur, amine, nitrogen, ash, calcium, and phosphorus. Molecular-weight data were obtained on the four types of wool at the Western Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry, US Department of Agriculture, in Albany, California, by Dr Wilfred H Ward. They were made available for use on the Wool Research Project through the courtesy of Dr Harold P Lundgren.

The chemical properties generally accepted as being closely related to the chemical behavior of wool are the cystine content and the alkali solubility. The cystine content, based on a reduction of phosphotungstic acid, was determined photometrically at the Textile Research Institute in Princeton, N J. The original procedure was introduced by Folin *(4)* and permits an experimental error of plus or minus 0.5 percent. The results shown in Table II reveal that all four wools are similar.

TABLE II

CYSTINE CONTENT

	%
Fine Australian	12.8
Fine Domestic	12.3
Medium Domestic	13.0
Medium New Zealand	12.5

* Presented by Wm F Brommelsiek in the West Ballroom of the Conrad Hilton Hotel in Chicago on Friday morning, Sept 18, 1953. The revised ms was recd by the Editor of Proceedings on Aug 1, 1954.

The alkali-solubility determinations were conducted at the Forstmann Woolen Company Laboratories with a modification of the procedure developed by Harris and co-workers (5). From the results shown in Table III it is evident that no significant differences exist in this characteristic of the four wools.

TABLE III
ALKALI SOLUBILITY

	%
Fine Australian	11.5
Fine Domestic	10.4
Medium Domestic	11.1
Medium New Zealand	10.3

The chemical properties were also studied at the ready-to-dye stage of manufacturing. Definite chemical changes were found, indicated by a decrease in the cystine content and an increase in the alkali solubility. The magnitude of these changes was similar for all four wools.

Figure 1 shows the different color of the wools on a fine Australian piece and a medium domestic piece, determined spectrophotometrically. This difference may be of importance when pastel shades are being dyed. It becomes less important with increasing depth of shade.

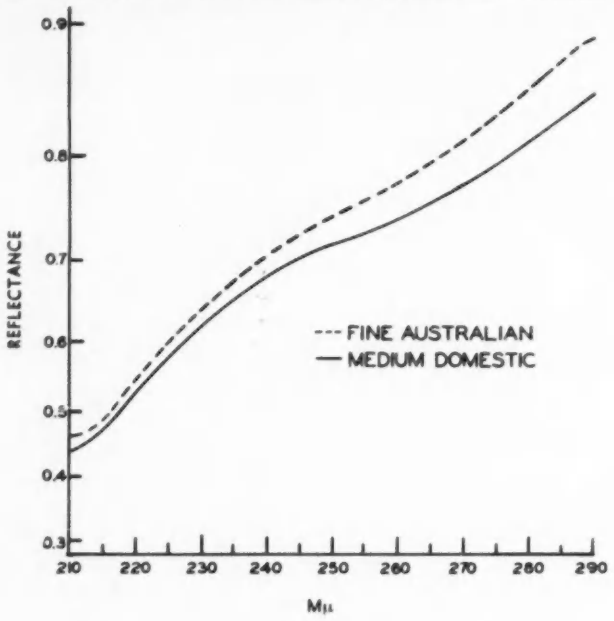


Figure 1

The natural color of the pieces made from the fine Australian and Medium Domestic wools before dyeing was spectrophotometrically determined. The color differences, as shown by the curves, did not affect the shades dyed.

DYEING PROCEDURE ——— Pieces woven from each type of wool were tacked and dyed in individual sets of four in a Krantz multireel machine with a liquor ratio of 30:1 and a fabric speed of sixty yards per minute. The four pieces were entered into the machine and wet out at 160° F for twenty minutes, a portion of the bath was run out, and the bath was refilled with sufficient cold water to lower the temperature to 120° F.

As no assistants were used during the wetting or dyeing of these pieces, the effects noted were probably due solely to the wools, the dyestuff, and the acid activity during the dyeing cycle.

A light tan shade was chosen in order to accentuate small shade differences among the four wool types. Realizing that variability of composition might result in the weighing out of small amounts of dye of each color for the various individual dyeing experiments, we made a special, homogenous dye blend in advance for use on all of the tan dyeings. This blend was suggested by Dr Hans Luttringhaus, then with the General Dyestuff Company, and was supplied to the Wool Research Project through the courtesy of that organization. The composition of the blend was as follows:

		%
Palatine Fast Orange GENA	Pr 315	14.9
Palatine Fast Claret RNT	no CI; no Pr	11.7
Palatine Fast Blue RRNA	Pr 319	18.5
Palatine Fast Yellow ELNA	Pr 330	35.8
Glauber's salt		19.1

The shade produced with one percent of this mixture was used as the standard.

The dissolved dyestuff was added to the dyebath containing the wet pieces at 120° F. After the pieces had run in this bath for ten minutes, 8 percent sulfuric acid, 66° Bé, which had previously been proportionally diluted, was added over a period of 15 minutes. Following an additional run of 10 minutes, the temperature control was set to raise the bath to the boil in 1½ hours and was maintained there for 2 hours. A slow cooling completed the cycle.

Fabric samples and liquor samples were taken. The fabric samples were taken after the acid addition, at 140° F, at 180° F, at the boil, after 1 hour at the boil, and after rinsing; while the liquor samples were taken at 120° F, before the acid, at 120° F after the acid, then at every 10-degree temperature rise until the boil, every 15 minutes during the boiling period, and, finally, after the rinse. These samples were analyzed chemically and/or spectrophotometrically.

DYEING RESULTS ——— Three sets of four pieces of each of the four wools were dyed. Since the pieces had been carefully processed and dyed with very close control, the results were significant and gratifying in that the expert examiners could find no differences between the twelve pieces representing any one wool. The individual pieces were uniform in shade.

These results indicate that for these pieces proper application of the fundamental principles of wool dyeing superseded the necessity for wetting agents or surface-acting leveling agents.

SPECTROPHOTOMETRIC DYEING EXHAUSTION RATE———A Beckman Quartz spectrophotometer, Model DU, was employed, and the liquor samples, taken at 120° F after the acid addition, were accepted at zero-percent transmission. Readings were taken at 20-millimicron intervals between 360 and 680 millimicrons. The exhaustion was determined at the low point according to the formula:

$$\% \text{ exhaustion} = \frac{s}{x}$$

s = low point of standard
x = low point of sample.

A comparison of the curves of the three dyeings for each wool revealed remarkable similarity of exhaustion rate. In Table IV are shown the spectrophotometric measurements representing the dye bath exhaustion. Figure 2 shows the three dyeing rate curves for a wool type. The figure reveals that, when the three curves of the individual dyeing rates are compared, they resemble each other.

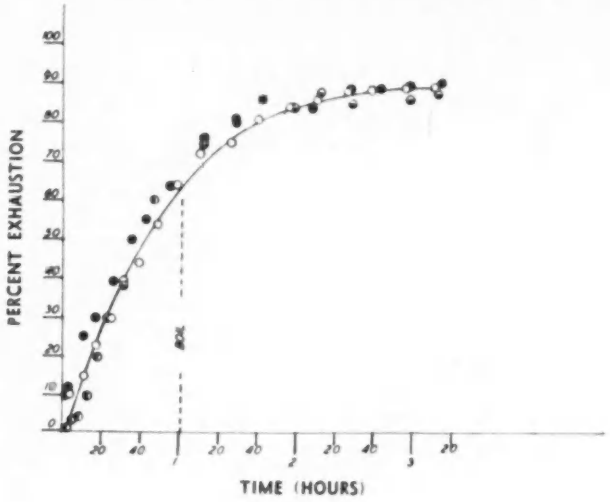


Figure 2

Dyestuff exhaustion rate of the three batches of pieces made from fine Australian wool
Batch 1———filled circle
Batch 2———open circle
Batch 3———half-filled circle

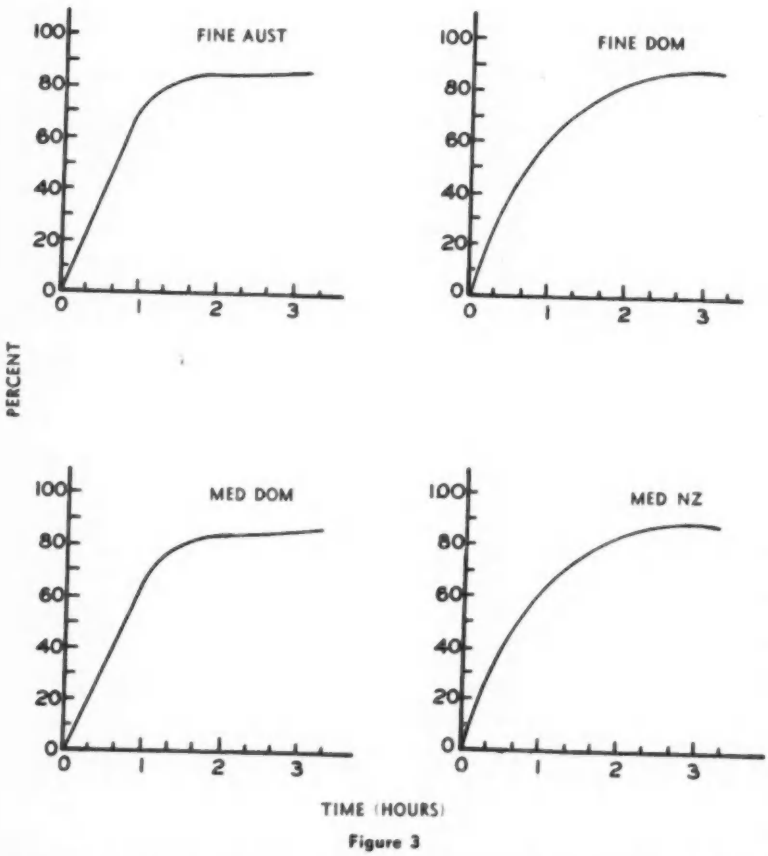


Figure 3

Average dyeing exhaustion rate of the three batches of pieces made from the four wool types.

TABLE IV
DYEBATH CONCENTRATION—FINE AUSTRALIAN WOOL
Metalised Tan

Time Min	1 %	2 %	3 %
0	100.0	100.0	100.0
20	77.0	69.0	80.5
40	57.0	48.5	51.8
60	37.0	35.0	34.0
80	27.5	23.0	25.0
100	21.0	16.8	20.0
120	16.5	14.0	17.5
140	14.0	12.5	17.0
160	12.5	12.0	16.0
180	12.0	11.5	14.5
195	11.5	10.5	13.5

During the dyeing cycle the medium wools absorbed a greater amount of dyestuff at the lower temperature range. This variance can be seen in Figure 3, where the exhaustion curves for the four wools are shown.

Although there is a spread of approximately 5 percent between the wools during the low-temperature dyeing period, the curves approach each other at the boil with an exhaustion of about 77 percent, and remain more or less parallel throughout the boiling period even though the exhaustion increases to about 83 percent.

Dyeings of piece goods made at the Organic Chemicals Division of the American Cyanamid Company in the Dyeometer with the tan recipe and a navy-blue recipe produced similar results. The blue shade was produced with 5 percent Palatine Navy Blue LF following the identical procedure used for the tan. Figures 4 and 5 show these results.

The relative strengths as based on the spectrophotometric reflectance measurements were made on the fabric samples removed during the mill dyeing cycle. These data are shown in Table V. The fine Australian wool at 120° F was taken as an arbitrary 100 value.

DEPTH OF SHADE RELATION ——The results of the dye-exhaustion studies closely parallel the significant differences in shade depth attributable solely to the fineness grades of the wools. The following estimates were made after visual examination of the fabrics: the fine Australian wool was 5 percent lighter than the fine Domestic and 20 percent lighter than the medium wools. Microscopical studies in transmitted light have confirmed these observations as shown in Figure 6 by the cross section of yarns taken from both the fine Australian and medium Domestic navy-blue pieces.

Two experiments were conducted regarding the acceptance of the visual impression.

Separate dyeings were made with 5000 fibers of the fine wool and 5000 fibers of the medium wool. Each bundle was weighed individually, and, accordingly,

TABLE V

RELATIVE STRENGTHS

Based on Fabric Reflectance Measurements

Temp	*Fine Aust*	*Fine Domestic*	*Med Domestic*	*Med New Zealand*
120° F	100	118	133	137
140° F	112	125	148	160
180° F	176	208	267	300
boil	270	320	390	420
1-hour boil	310	340	420	430
2-hour boil	310	340	420	430

the requisite amounts of dyestuff and chemicals were employed to produce a 5-percent dyeing of Palatine Navy Blue LF. The results were similar to those produced on the fabrics. This observation indicates the falsity of the theory that a lighter shade for finer wools is attributable to the greater number of finer fibers in a given unit weight of fabric or stock.

The theory regarding reflection differences from fibers was tested by a procedure suggested by Haller and Clutz of the Forstmann Woolen Company Laboratories. They recommended pulverizing the fibers in a Wiley mill. The mill breaks the fibers into minute particles of approximately 120-micron length, producing a powder. Each of the four wools was pulverized and screened. The powders were individually dyed with 5 percent Palatine Navy Blue LF, filtered, and dried. Visual examination of the results revealed the depth of shade differences less strikingly than did the pieces.

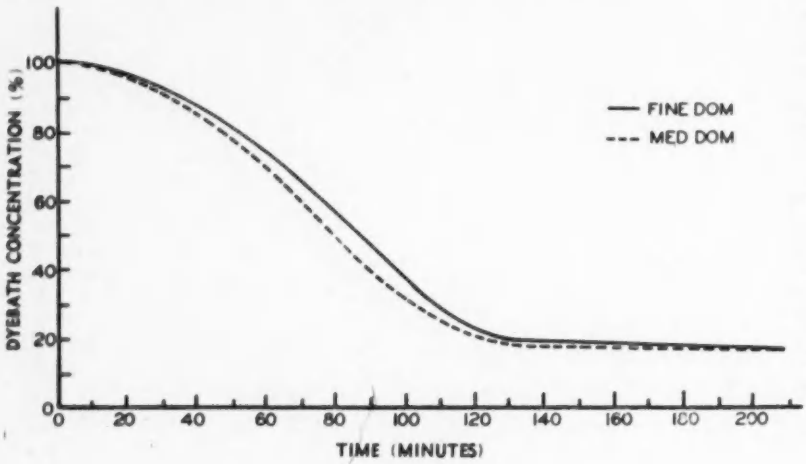


Figure 4

Difference in exhaustion rate as determined on the Tan shade with the Dyeometer between the fine domestic and the medium domestic wools

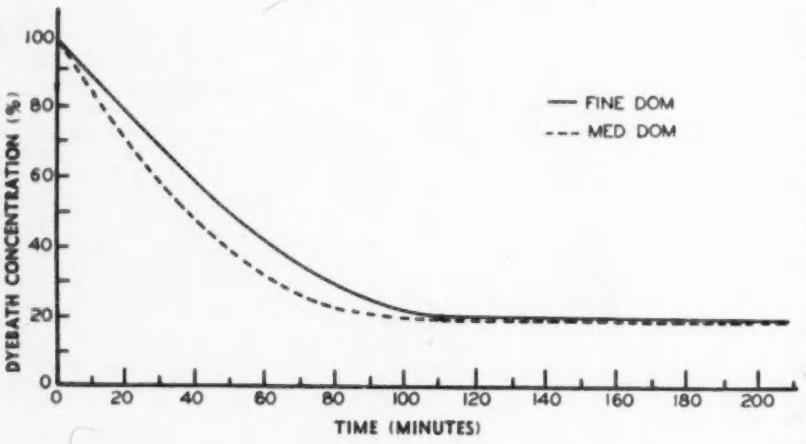


Figure 5

Difference in exhaustion rate as determined on the navy shade with the Dyeometer between the fine domestic and the medium domestic wools

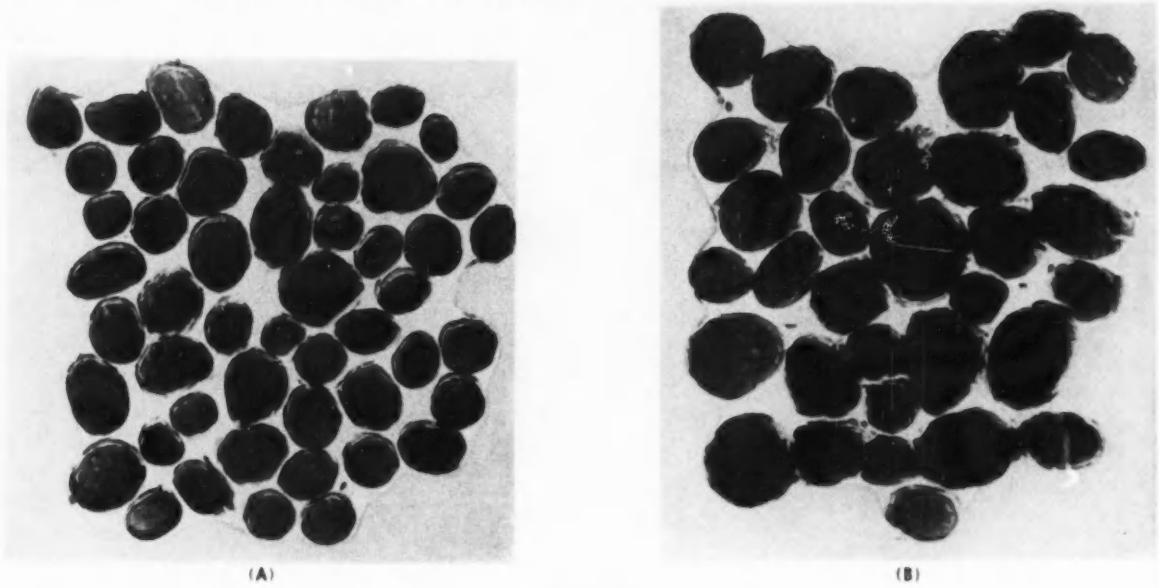
To analyze the shade differences further, the dried powdered wools were used individually as pigments with which pastes were made with 0.2 grams of the powdered fiber, 0.4 grams of zinc oxide, and 0.1 gram #1 litho varnish. Drawdowns were made with these pastes in the Laboratories of the Organic Chemicals Division of the American Cyanamid Company. The results, as shown in Figure 7, show the fine Australian wool to be the darkest and the other wools lighter in relation to their diameter. This is the opposite from what we see in Figure 6, where the cross section of the fine and the medium wool yarns are shown. An explanation of this opposite effect can be attributed to the fact that with equal weights of wool in the varnish there are many more fine fibers per unit volume than coarse fibers, and, although each fine fiber is of lesser depth of shade, the total depth is greater because there are more of them. A mathematical relation exists, which Brailey *(6)* explains as follows:

"Since there is an equal amount of dyestuff absorbed by both fine and coarse fibers when dyed separately, ie, the same number of chromophore color groups per unit of volume, the absorptivity index is the same for both fibers, and, in the first approximation, will be independent of the surroundings of the fiber, whether in air or in oil. It is known that for very large colored spherical particles the fraction of the geometric cross section which absorbs light will be independent of the size. This is true because the particle is completely opaque except for the light reflected off the front. Smaller-size particles should be less effective in absorbing light, just as a thin cell of dye solution is more transparent than a thick cell of it. At very small sizes near the wave length of light the absorption fractional cross section, F, can be expressed in terms of a power series in the diameter

$$F = k_1 d \pm k_2 d^2 \pm k_3 d^3 \ldots$$

where k_1 is, of course, a positive number, and the choices of signs of the other terms can be calculated. A type of curve obtained is shown in Figure 8, where the linear slope at small diameters is k_1.

In Figure 6 each fiber is surrounded by a dried film of cellulose acetate, which has a refractive index close to that of wool, so that the ratio of their refractive indices is almost unity. Every refractive-index ratio and absorptivity-index combination has a different curve associated with it, showing the relationship between F, the fraction of the cross section of a spherical particle which absorbs light, and



(A) (B)

Figure 6

Cross sections of navy-blue yarns from a piece lot (A) fine Australian and a piece of (B) medium domestic wools. The difference in depth of shade is clearly seen by the medium wool being much darker.

the diameter d of the particle. Theory tells us that, when the refractive-index ratio is close to unity, the plot of F versus d is linear to relatively large sizes, large with respect to the wave length of light. In the case of fine wool the 19.8-micron cross section is large with respect to the wave length of visible light, which is about one-half micron.

Indeed, the contrast between which wool has greater depth of shade in the two methods of measurement—transmission of the fiber and reflectance of the dispersion—arises from the fact that the wool sizes considered fall at the end of the first linear portion of the curve of F versus d.

That this is the region involved can be shown by a comparison of the depth of shade with the particle diameter. In relation to the Australian fine wool the diameters of the domestic fine and the medium wools are, respectively, 1.065 and 1.326. If the fiber diameters were of sizes corresponding to the linear portion of the curve, we should expect the depth of shade observed in the transmission of light through a microscopic cross section of each to be in the ratio of 1.00 to 1.065 to 1.0326, since in this region the fractional efficiency (depth of shade) of equal-sized portions of the cross sections of each is proportional to the diameter. However, the exhaustion depth of shade of a worsted fabric of Australian fine wool was 95 percent of the domestic fine and 80 percent of the medium wools. In terms of the Australian fine wool these are ratios of 1.050 and 1.250, which are respectively 98.5 and 93.3 percent of the values expected on the straight-line section of the graph, so that in this region the curve of F versus d is beginning to curve over to form the first maximum on the diagram. This means that the sign in front of k_2 in the expansion of F is negative. Of course, these fiber particles are not spheres but cylinders of axial ratio of about 6 to 1. At such elongations it is the smaller dimension—that is, the diameter—which governs optical behavior, so that qualitatively the rules for spheres may be applied.

TABLE VI

WOOL-GRADE : DEPTH-OF-SHADE RELATION

	Fine Australian	*Fine Domestic*			*Medium*
Wool Grade	70	64	62	60	58
Wool Fineness, μ	19.8	21.1	23.3	24.8	26.6
Dyestuff Equivalent, %	100	95	90	85	80

When we prepare a drawdown paste of the wool with zinc oxide and litho varnish, we are concerned with the reflectance, which, to a first approximation, is given by the Kubelka-Munk equation:

The reflectance is proportional to the ratio S/K at low reflectances and increases regularly and monotonically with S/K at larger values of S/K. The scattering in mass is the sum of the scattering by the fiber and the scattering by the zinc oxide pigment. Because the refractive index of wool is close to that of linseed oil, the scattering by the fibers is negligible, and all the scattering may be considered due to zinc oxide, a strong, white-scattering pigment. Since the paste prepared from the fine wool and that from the medium wool contain the same amounts of zin oxide, the scattering coefficient S is the same for both pastes. The absorption of zinc oxide is negligible, as is true of all strong, white pigments, and only the absorption of the wool need be considered. The relationship

$$R = \frac{=}{\frac{K}{S} + 1 + \sqrt{\frac{K}{S}\left(\frac{K}{S} + 2\right)}} \qquad 1$$

where R = fractional reflectance of the drawdown paste
K = absorption of light by the paste, in mass
S = scattering of light by the paste, in mass.

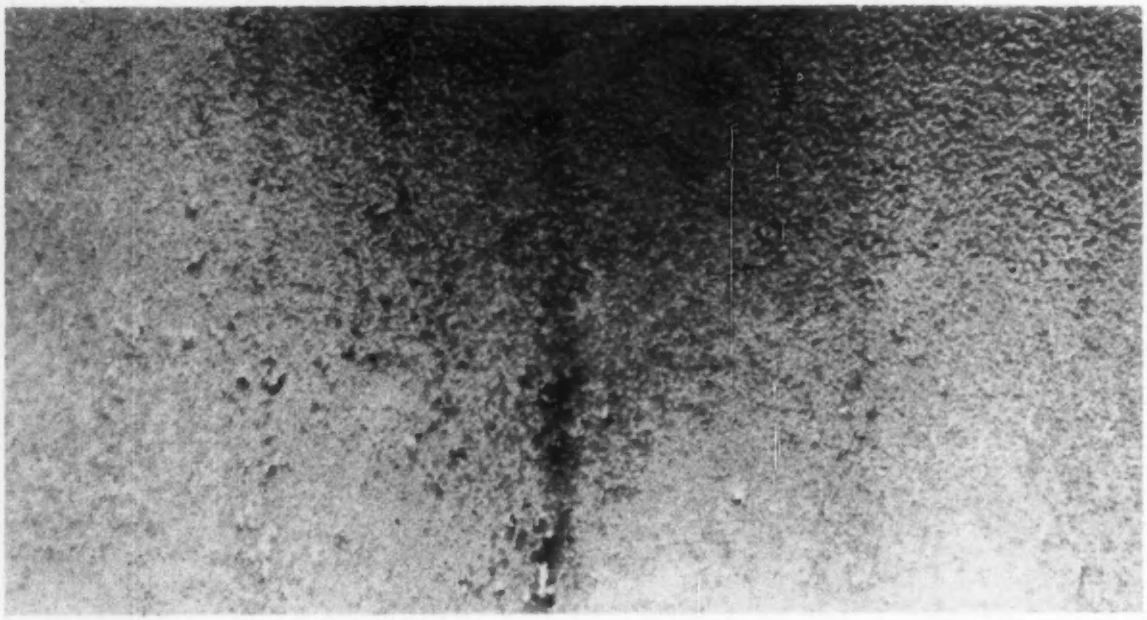


Figure 7

Photographic reproduction of pulverized wools, dyed Navy Blue, made into paste, and drawn down. The Australian wool is darkest and the other wools are relatively lighter according to their diameters. The shade differences within one wool area are due to density variation of the paste.

between K and F of the wool is given by

$$K = n \cdot \pi \left(\frac{d}{2}\right) \cdot F$$

where n = number of wool particles per cubic centimeter,

$$n = \frac{c}{\frac{4\pi}{3}\left(\frac{d}{2}\right)^3}$$

c = volume fractional concentration of fiber, if we consider the fibers as spheres. Since F is the fraction of the cross section, and $\pi \left(\frac{d}{2}\right)^2$ is the cross section, the product is the mass absorption per particle, and when multiplied by n is the mass absorption per cc. It can therefore also be written as

$$K = \frac{3}{2} \cdot c \cdot \frac{F}{d}$$

We may also write

$$K = \frac{3}{2} c \cdot (k_1 - k_2 d \ldots),$$

since the d in the diameter will cancel a d in each one of the terms of the series for F. From the equation the largest value of K occurs when d approaches zero, pro-

TABLE VII
CHROMIUM CONTENT

Laboratory	Fine Australian %	Med New Zealand %
Organic Chemicals Div of the American Cyanamid Co	0.22	0.14
General Dyestuff Co	.22	.16
Forstmann Woolen Co	.23	.15

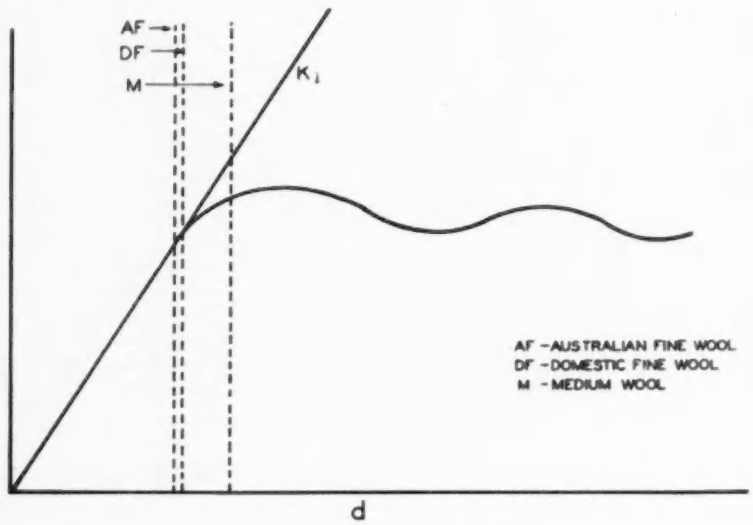


Figure 8

Schematic diagram of the fraction of the geometric cross section which absorbs light blotted versus diameter; pulverized, in oil.

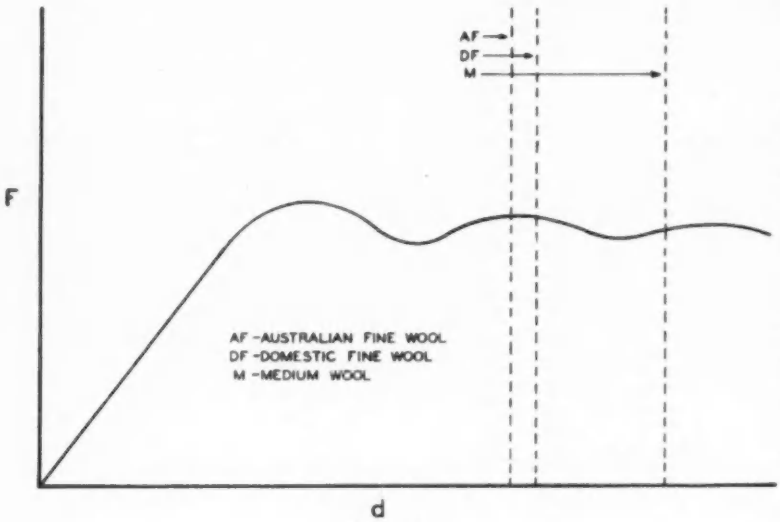


Figure 9

Schematic diagram of the fraction of the geometric cross section which absorbs light plotted versus fiber diameter; pulverized, in air.

vided constant concentration c of fiber is maintained. This means that the K of Australian fine wool will be higher than the K of the other wools. Indeed, we have already shown the ratios of the K of the others to the Australian fine were 98.5 and 95.3 percent, respectively, from the depth of shade of the dyeing. Since the small-diameter fiber has the larger K, it will have the smaller S/K value since the S values were the same for all the drawdown pastes. This smaller S/K means a smaller reflectance, that is, a darker color, which means a stronger color. Thus, if the reflectance of the medium wool paste were, say, 40 percent, the reflectance of the Australian fine wool paste would be 38.8 percent, a difference small but noticeable.

We recall the experimental result that powdered fibers examined in air showed less strikingly the differences in shade depth than did the dyed pieces. The differences are likewise less noticeable than in the drawdown paste where particles were surrounded by varnish and not air. The reason is that the ratio of refractive

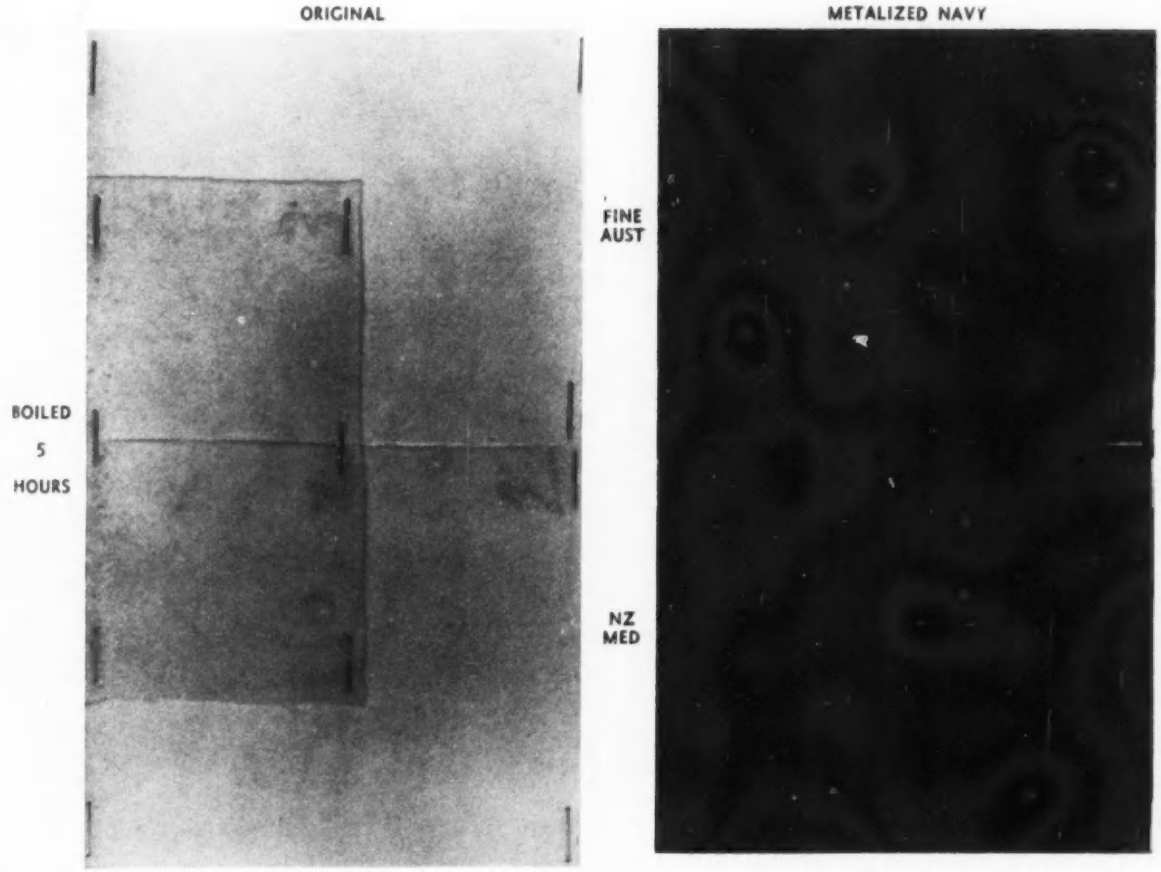


Figure 10

The photographs show that prebolling the fabrics for 5 hours does not alter the depth of shade relation between the fine Australian and medium New Zealand wools.

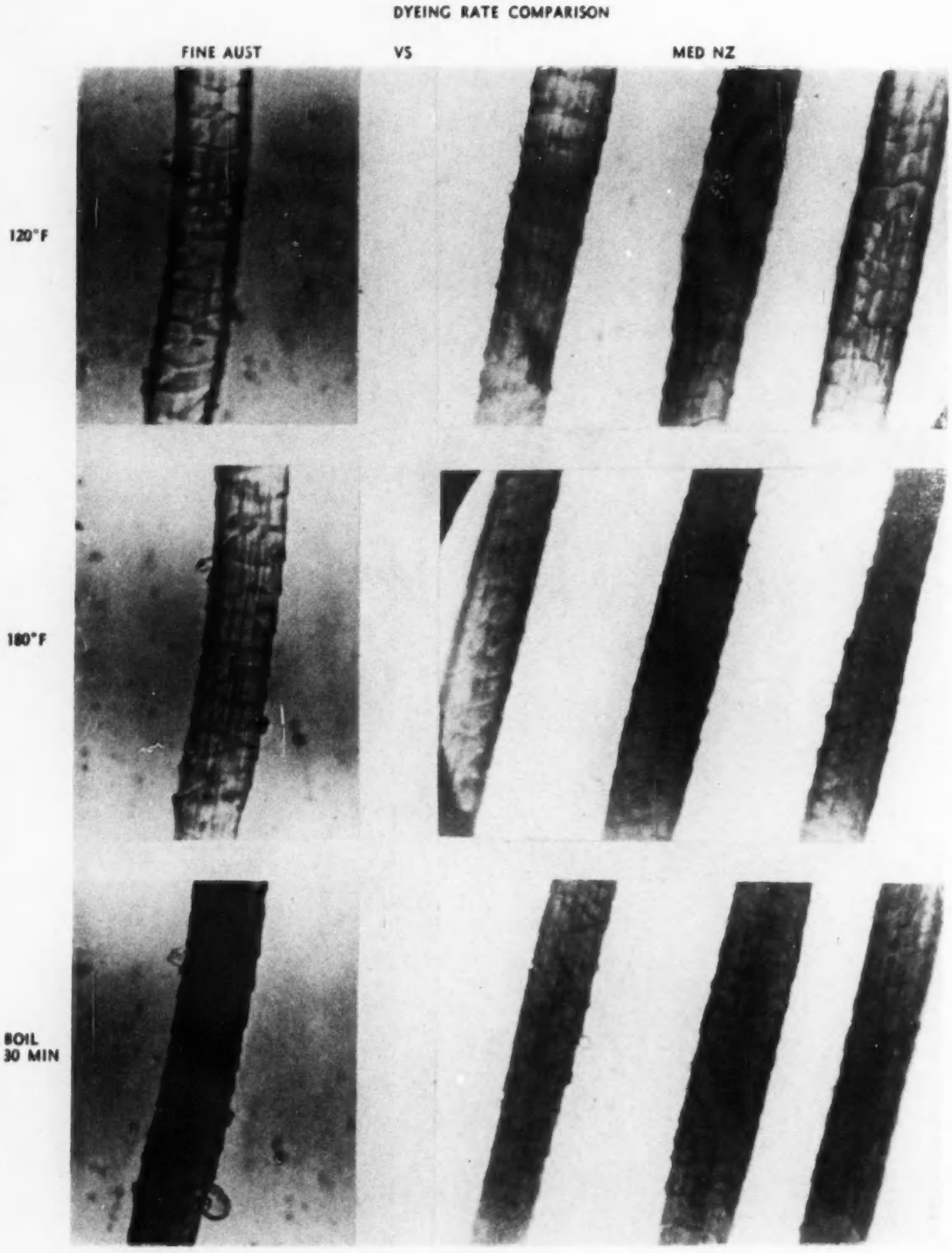


Figure 11

The coarser wool dyes more rapidly than the finer wool in separate dyebaths. At 120°F the Australian fiber is still almost colorless, whereas the New Zealand fiber has exhausted a portion of the dye from the bath. As the temperature rises and during the boiling period the Australian fiber continues to become darker, whereas the New Zealand fiber appears to remain constant after the boiling temperature is attained.

index of wool to that of air is sufficiently greater than unity—equals 1.55—that the position of the absorption maximum in the plot of the (new) F versus d is shifted to sizes much smaller than fiber size so that F becomes rather independent of size, as shown in Figure 9. A similar F may be plotted against d for the scattering of the fibers (which will look different at smaller sizes from the F for absorption), but at these large fiber sizes the curve is likewise horizontal, ie, constant. We thus get

$$K = \frac{3}{2} \cdot c \cdot \frac{F\ (\text{absorption})\ (= \text{constant})}{d}$$

$$S = \frac{3}{2} \cdot c \cdot \frac{F\ (\text{scattering})\ (= \text{constant})}{d}$$

such that the ratio S/K is now reasonably constant with size. There is no scattering from any zinc oxide when the washed dried fibers are viewed in air. Although the S of the fibers was so small we neglected it in the zinc oxide pastes, here it is the only scattering component present and cannot be neglected. The expected result is that the fibers in air will not differ or will differ only slightly in depth of shade. This seems to be so—at least the difference is much less.

Since the visually noted shade differences have been determined to be factual, the accurate depth of shade relationship between the wools was established. Laboratory dyeings were made by the identical procedure as for the practical trials. Graduated increases in dyestuff amounts were made on the fine wools so that a final shade equal to the medium wools would be obtained. The matches were identical on the dyeings employing the dyestuff increase recommended on the basis of the visual observation of the practical trials. Differences in depth of shade were expected; however, the accuracy with which the relationship between the wool grades permits the predetermination of a specific shade difference was only perceived after these controlled dyeings were completed.

It has previously been stated that this work was undertaken with a metalized tan mixture. To further substantiate this relation, several series of laboratory dyeings were made with added dyestuff types, namely: acid and top-chrome.

A practical attempt to overcome this difference in shade depth between wool grades was made by boiling pieces five hours prior to dyeing. The unsuccessful results are seen in Figure 10.

A further attempt was made to relate the known differences in depth of shade to dyestuff within the fibers by determining the amount of chromium present. Three laboratories analyzed the fine Aus-

MICRODYEOSCOPE DYEING COMPARISON

FINE AUST & COARSE MONT WOOLS DYED SIMULTANEOUSLY

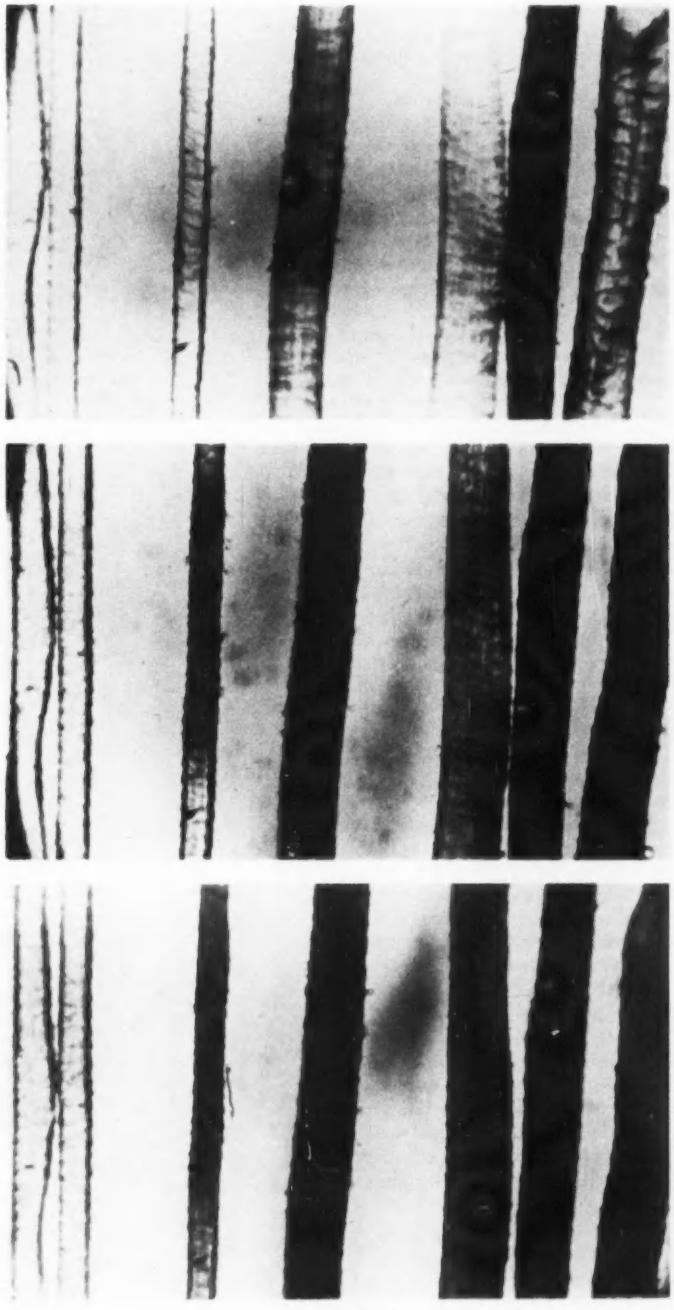


Figure 12

The fine fibers absorb the dyestuff slower than the coarse wool even when dyed in one bath. At 150°F there is already considerable contrast. The coarse wool does not relinquish the dyestuff during the boiling period.

The difference in absorption within a wool is due to the variation within the fiber along its length. The tip portion of the fiber has been removed.

tralian wool and the medium New Zealand wool which had been dyed with 5 percent Palatine Navy Blue LF. This dyestuff contains 5.5 percent chromium. The analysis revealed a chromium content of 0.22 percent for the fine Australian wool and 0.15 percent for the medium New Zealand wool. These figures represent a dyestuff equivalent of 4 percent and 5 percent, respectively. Based on an 80-percent exhaustion from the dyebath, we note a good correlation for the fine wool, whereas for the medium wool there is 1 percent of dyestuff unaccounted for, based on the fabric weight.

At this time the depth-of-shade relation obtained when wools of different finenesses are dyed simultaneously were observed. The contrast is accentuated, with the difference between the fine wools being 10 percent and between the fine Australian and the medium wools reaching 30 percent. This can be understood when it is recognized that more rapid exhaustion takes place with the coarser wools during the lower-temperature period up to the boil, and this increased amount of dyestuff is not relinquished during the boiling period.

In order to observe this effect further, individual fibers of the fine and medium wools were dyed separately in the Microdyeoscope. From the prints in Figure 11 this more rapid exhaustion is readily discernible. These observations do not confirm the findings of Vickerstaff *(1)* reported before the Institut Textile de France in 1950.

As previously discussed, visual and microscopical observations of the finished pieces clearly indicate that the fine wools produce lighter shades. It is known that there is a random distribution of fibers ranging in diameter from 10 to 30 microns in fine wools and from 10 to 50 microns in medium wools. Therefore, it could be expected that the shade difference found in the finished pieces would be apparent in the cross section of different-diameter fibers in each wool grade. It is interesting to note that this is not the case, as shown in Figure 6. Both photographs reveal insignificant differences in depths of shade even though significant variations between fiber diameters exist within each wool grade. This depth-of-shade relation is obtained with both acid and chrome dyestuffs.

This phenomenon was studied during the course of three navy-blue dyeings in the Microdyeoscope, an instrument specially designed for the study of dyeing properties of individual fibers *(7)*. A special series of fiber samples was removed during regular production sorting of an Australian and a Montana fleece. The finest and coarsest staples of each of these fleeces were selected and cleaned with

DYEING RATE COMPARISON
MONTANA WOOL—DIFFERENT DIAMETERS

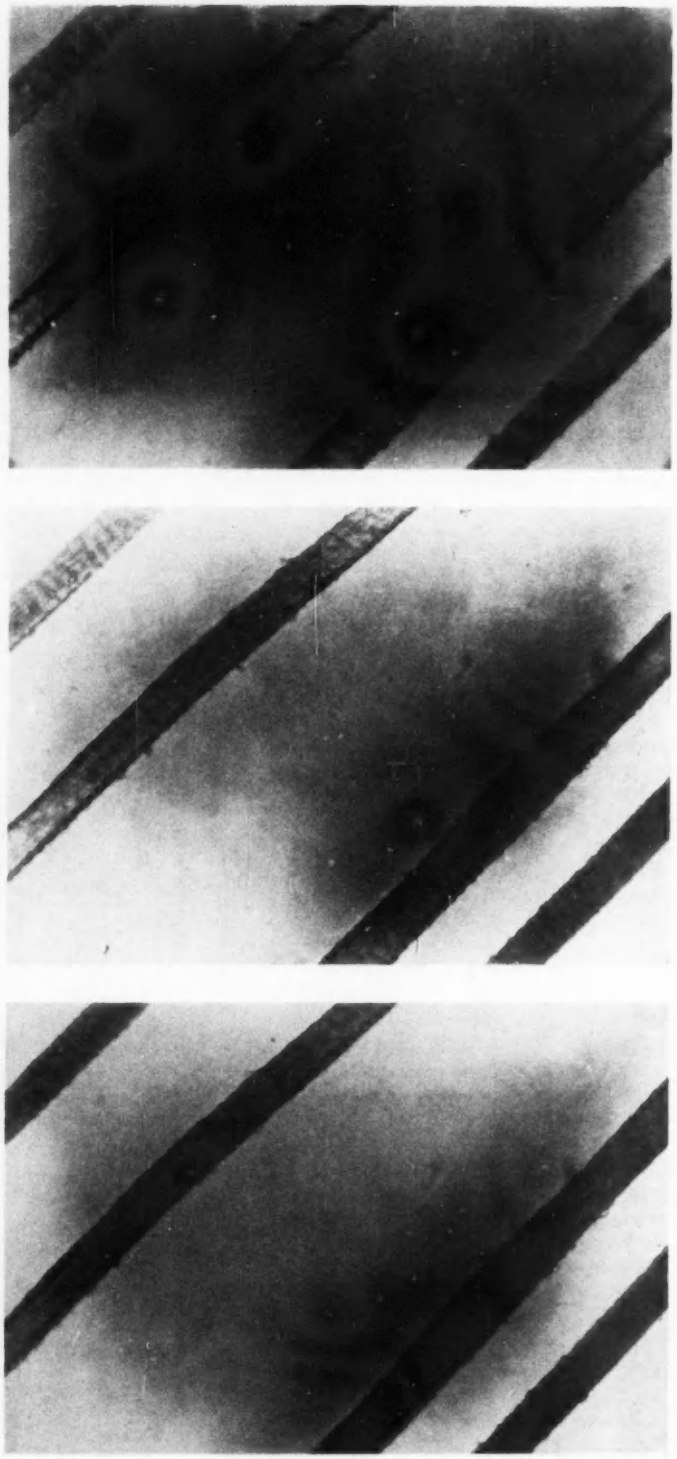


Figure 13A

Different wool grades of the same wool type also have different exhaustion rates. Figure 13A shows the coarser fiber to exhaust more rapidly and be darker in shade after the boiling period. In Figure 13B the same analysis can be made although there is a greater variation in the exhaust

DYEING RATE COMPARISON
AUSTRALIAN WOOL—DIFFERENT DIAMETERS

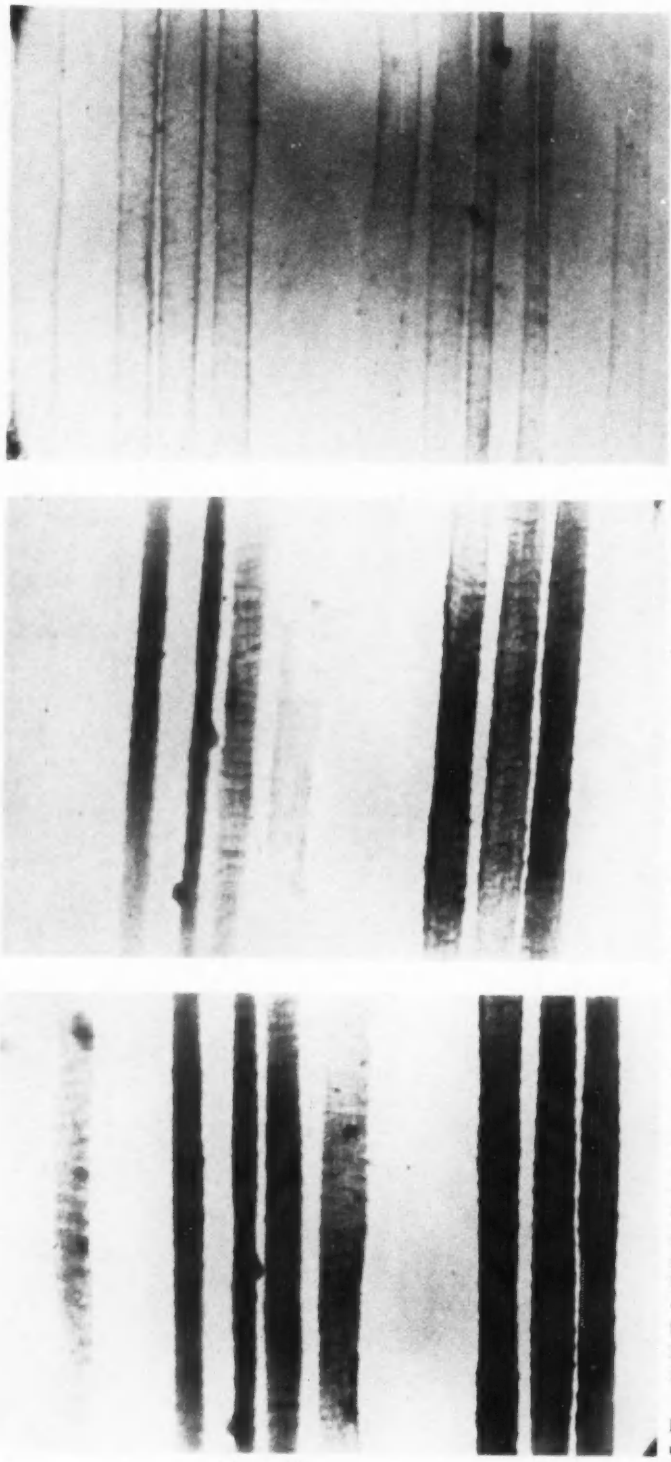


Figure 13B

rates of the various portions of the fibers. The greater depth of shade is noted of the finest portion of the fine fiber. This is the portion closest to the tip and may show some weather influence.

carbon tetrachloride and a water rinse. The fineness measurements of the fibers in these staples are seen in Table VIII.

In the first dyeing, a coarse Montana and fine Australian fiber were observed simultaneously. Already at 150° F a very significant difference in depth of shade was observed, the Montana wool being much darker. This difference is not only maintained but becomes more exaggerated toward the boil and does not level out after 1½ hours' boiling. This can be seen in Figure 12.

A second dyeing conducted with a fine and a coarse Montana fiber revealed a slightly more rapid take-up by the coarser fiber, although at the boil and when finished boiling, an insignificant difference in shade depth was present, as noted in Figure 13A.

A third dyeing for a fine and coarse Australian fiber followed the same pattern as did the second dyeing. It revealed the results as shown in Figure 13B.

While the preceding data dealt with the dyeing characteristics of wools of different grades, it has also been determined that the degree of natural damage influences the dyeing behavior of wools of the same grade.

New Zealand and East Indian carpet wools of 44's grade afforded an example of this property. Examination of the undyed wools in ultraviolet radiation, Figures 14A and B, shows a considerably greater intensity of fluorescence for the East Indian wool. This is an indication of a greater natural damage.

Equal amounts by weight of the New Zealand and East Indian wools were dyed in the same bath with 3 percent Calcocid Alizarine Blue SAPG, 8 percent Na_2SO_4, and 3 percent H_2SO_4. The rates of dye absorption and the affinity of the fibers for dye are different. Samples of each wool were removed at 170° F, at the boil, and after boiling for 30 minutes. These samples were cross-sectioned for microscopical examination.

At 170° F and until the boil the East Indian wool was dyed more uniformly than the New Zealand wool, as shown in Figures 14D and 15F. The New Zealand wool, Figures 14C and 15E, shows some fibers to be still undyed, while others are medium or dark. From the time the dyeings reached the boil and during the boiling period, the levelness of the two wools reversed. The East Indian wool became progressively less level, while the New Zealand wool became more level. Figures 15G and 15H.

The greater natural damage of the East Indian wool made possible a rapid and uniform adsorption of dye at lower temperatures. However, many of these fibers lost much of their dye (desorption) during the boiling period and the over-all shade became weaker in intensity.

DYEING COMPARISON—CARPET WOOLS

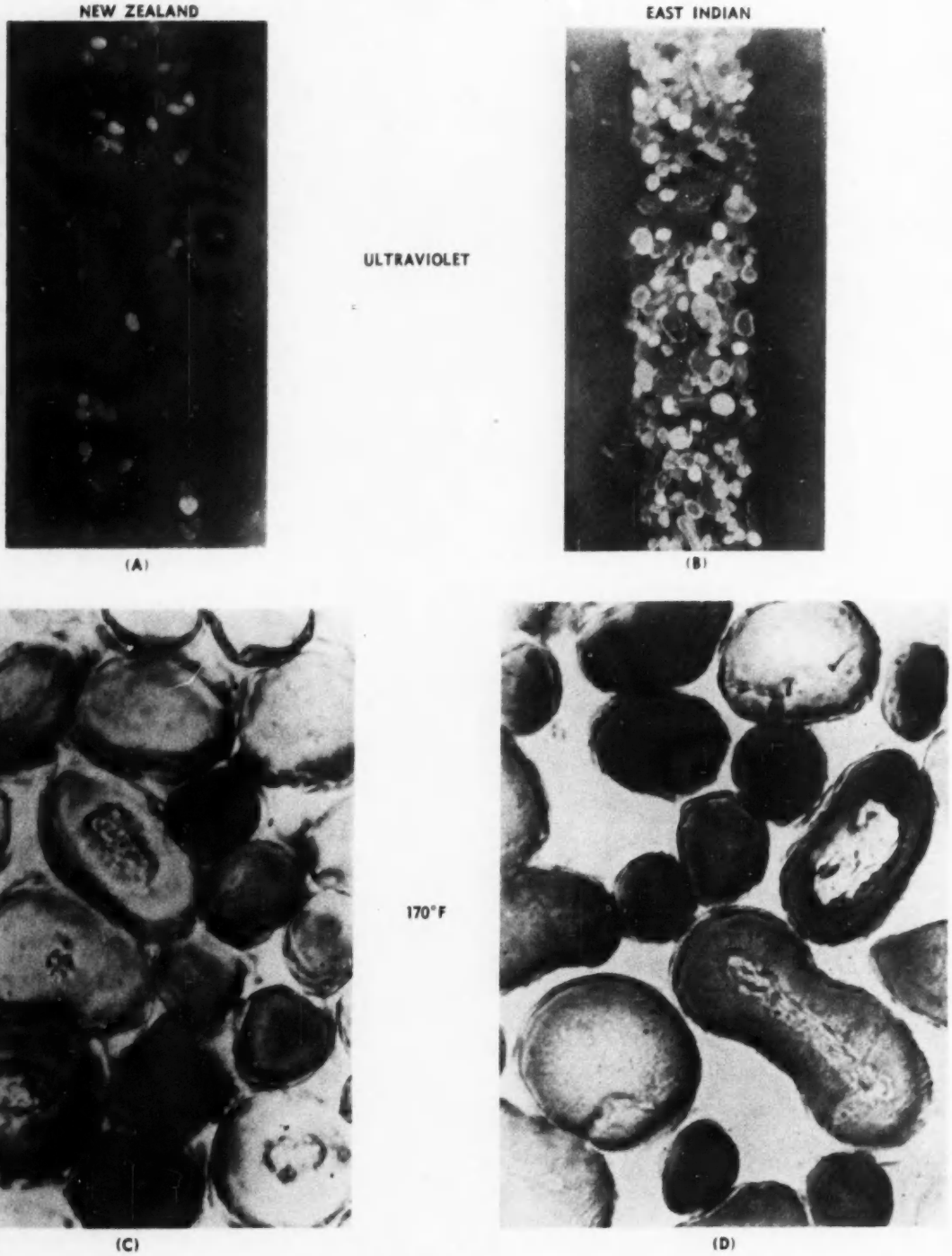


Figure 14

The ultraviolet transmission photomicrographs reveal a greater fluorescence for the East Indian wool. This denotes a greater degree of damage. The damaged fibers dye with greater ease as noted in the cross section "at 170° F." While the East Indian fibers (14D) appear to be quite uniform, the New Zealand fibers (14C) show great contrast. Until the boil this contrast is still prevalent, although, the New Zealand wool is becoming more and more uniform (14E). During the boiling period a reversal takes place. Some of the East Indian fibers lose most of their dyestuff and, therefore, produce a skittery dyeing (14H), whereas the New Zealand wool is becoming more uniform (14G).

DYEING COMPARISON—CARPET WOOLS

NEW ZEALAND

EAST INDIAN

AT BOIL

(E)

(F)

30-MIN BOIL

(G)

(H)

TABLE VIII

AVERAGE FINENESS

Australian				Montana			
Fine		Coarse		Fine		Coarse	
Microns	Grade	Microns	Grade	Microns	Grade	Microns	Grade
24.9	60's	27.0	56's	24.8	60's	32.2	48's

SUMMARY

Controlled dyeings of pieces and laboratory analyses have produced a quantitative relation between wool grades and depth of shade. Practical piece dyeing has been accomplished on this basis.

Microscopic observations during the dyeing of fine and coarser fibers of a given wool or different wools reveal more rapid absorption of dyestuffs by the coarser fibers. This is also substantiated by the spectrophotometric exhaustion analysis of the controlled dyeings of the fine- and medium-wool pieces.

Fibers of different diameters of a given wool grade dye to the same depth of shade. This is also true for the finest and coarsest fiber within a skirted fleece.

The transmission of light through a uniform cross section of fine or medium wools shows the reverse contrast to the reflectance from pigment pastes of the same fibers pulverized.

Wool dyeings that are level during the low-temperature period of the dyeing cycle are not necessarily level at the end of the boiling period, whereas some wools that are very poorly penetrated at lower temperatures may produce very uniform results.

DISCUSSION

Question: Have you any theory to account for the differences in dyeing behavior between different wools? Are the surface structures of these wools different?

Answer: We have no theory to submit and further are seeking suggestions for a theory. Our work dealt with the development of techniques, the evaluation of results, and now the presentation of data which confirm or refute certain accepted opinions.

Q: I was of the opinion that when dealing with one wool type the finer fibers were more heavily dyed than the fibers of greater diameter.

A: I believe our colored cross sections showed that within a wool grade all fibers are of the same depth of shade.

Q: In one series you showed fine Australian fibers and coarser Montana fibers, in another series you showed fibers of different diameter from the same fleece. Did the difference in fiber diameter on one fleece occur by accident?

A: No, within a fleece, there generally is a greater variation in fiber diameters than shown here.

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WESTERN NEW ENGLAND SECTION

Meeting of October 1, 1954

Speaker: I H Welch, American Viscose Corp (top row, left)

Meeting of November 12, 1954

Speaker: H F Creegan, James Hunter Machine Co (left in both photos in top row)

Meeting of December 10, 1954

Speaker: R H Phillips, Cranston Print Works Co (center photo, top row)

(Photos by A N Henschel)

Contribution——

INVESTIGATION INTO THE USE OF DIAMMONIUM PHOSPHATE IN THE DYEING OF DACRON AND DACRON-WOOL BLENDS*

GEORGE W SPICER
Textile Aniline & Chemical Company
Dublin, Georgia

The use of the sodium salt of orthophenylphenol has proven effective as a dye carrier in dyeing Dacron polyester fiber, especially the Dacron of wool-Dacron blends. The use of diammonium phosphate for converting the water-soluble form to the insoluble orthophenylphenol is described. This method has proven advantageous in dyeing a wide range of shades on piece goods by a simple and controllable one-bath process. The information described was gathered from experience with actual mill productions as well as from laboratory experiments.

INTRODUCTION

WITH the advent of Dacron polyester fiber into the woolen and worsted industry has come the accompanying problem of dyeing blends successfully on present dyeing equipment by familiar methods. After considerable work to find carriers suitable for dyeing the Dacron, our selection of the sodium salt of orthophenylphenol for this purpose was based on the following advantages:

1) Comparatively nontoxic
2) Highly soluble in water
3) Easily removed after dyeing
4) Comparatively inexpensive

This investigation, then, will deal with the use of diammonium phosphate as a regenerating agent with the sodium salt of orthophenylphenol in existing piece-dye equipment.

PREVIOUS METHODS OF MIXED-FIBER DYEING ——— The previous method of dyeing mixed fabrics containing Dacron was at best a two-stage operation involving first the dyeing of Dacron with a phenolic type of carrier in the presence of sulfuric or acetic acid to regenerate the free phenol. The next step was the cooling and scouring operation, and the final step was the dyeing of the wool. During the first step of this lengthy operation, the wool was first subjected to a pH above 10, and the pH value was reduced to a resultant pH proportional to the quantity of acid added to regenerate the phenol. The main disadvantage in this method were as follows:

1) The length of the dyeing cycle was more than double that for comparable woolen or worsted fabrics.

2) The pH of the carrier bath was important in the dyeing of Dacron, and, because of this, extreme care had to be taken to insure that the desired amount of acid was employed to regenerate the phenol.

3) The chances of streaks were increased by the possibility of uneven application of regenerating acid.

* Contribution received by the Editor of Proceedings on October 23, 1954.

PRESENT METHOD OF MIXED-FIBER DYEING

Wool-Dacron unions can be successfully dyed in present equipment by a one-bath process through the use of diammonium phosphate as a regenerating agent. The dyeing cycle closely simulates that of regular woolen or worsted fabrics.

Under the present method, the goods are circulated in the diammonium phosphate, the dyestuffs for both wool and Dacron are added, and the temperature is slowly brought to 140 F. At this point the previously dissolved sodium orthophenylphenol is added slowly as the bath temperature is raised. The addition should be completed at 160 F, and the temperature is then brought to the boil. The boiling is continued for one hour, when the first patch is taken. The dyebath then boiled an extra one to one and one-half hours and cooled back. The bath is now dumped, and a new bath is set with DAP and a nonionic detergent of the ethylene oxide type. The bath is raised to 140 F, and the material is scoured for ten to fifteen minutes and cooled back. The material is then washed off and removed. It is now ready for dry finishing.

By this method the need for exacting measurements of the regenerating agent is eliminated because of the buffered pH drop of the DAP. This pH drop passes through the optimum pH range for Dacron dyeing, producing, even reproducible results plus greater money-value yield.

BUFFERING ACTION OF DIAMMONIUM PHOSPHATE———The buffering actions of DAP can be further illustrated by the following table outlining the pH cycle of diammonium phosphate, Fyrex (neutral ammonium phosphate, Victor Chemical Works), and mono-Ammonium phosphates.

pH VALUES
IN ONE LITER WATER

	5g Dowicide A	11.1
	5g DAP	7.9
	5g Fyrex	6.9
	5g MAP	4.8
No 1	5g Dowicide A plus 5g DAP	9.0
No 2	5g Dowicide A plus 5g Fyrex	8.4
No 3	5g Dowicide A plus 5g MAP	7.0

The pH values for mixtures of Dowicide A with phosphate show what the initial pH of the dyebath would be without regard for the influence of cloth and dyestuff.

The pH values resulting from heating mixtures Nos 1, 2, and 3 are given in Table I.

The addition of a mild acidulant, ammonium sulfate and acetic acid, results in a variance in the pH values of Table I to those shown in Table II.

ADVANTAGES OF DAP AS A REGENERATING AGENT———Those of you who have used DAP in wool dyeing will readily see the advantages of DAP for conditioning the wool in this union. This was outlined by George M Moisson in his article in the 1953 February edition of the *Textile World*. The following is a listing of advantages of DAP peculiar to wool-Dacron unions:

1) The fabric is not subjected to extreme changes in pH at any time during the dyeing cycle.

2) The buffering effect of the DAP conditions the wool for dyeing in addition to passing slowly into the optimum pH range for Dacron dyeing.

3) The dispersing effect of the DAP tends to eliminate the need for additional costly dispersers for the Dacron dyestuffs.

4) The results are easily reproducible, and the color values of the individual dyestuffs are increased.

TABLE I
EFFECT OF HEAT ON pH VALUES

Elapsed Time minutes	Temperature No. 1 °F	Temperature No. 2 °F	Temperature No. 3 °F	pH No. 1	pH No. 2	pH No. 3
0	room	room	room	9.0	8.4	7.8
15	142	144	154	9.0	8.2	7.0
30	181	181	187	8.9	8.2	6.9
45	208	boil	203	8.5	7.7	6.7
60	boil	boil	boil	8.3	7.4	6.7
75	boil	boil	boil	8.0	7.3	6.7
90	boil	boil	boil	7.5	6.9	6.4
115	boil	boil	boil	7.3	6.8	6.4
130	boil	boil	boil	7.1	6.6	6.3
145	boil	boil	boil	7.0	6.6	6.2

1) The pH curve very closely simulates that of the all-wool dyeings.

RECOMMENDED PROCEDURES——*A Single-Bath Process:* Set a liquor ratio of approximately 20 to 1. The goods are thoroughly wet out, and from 10 to 20% of DAP owf is added to the bath (depending on the depth of shade). The previously pasted acetate dyestuffs and the dissolved wool dyestuffs are added slowly to the bath, and the temperature is raised to the boil over a 45-minute period. A quantity of sodium phenylphenol equal to the DAP is dissolved in sufficient water at 110°F to effect solution and is added slowly to the dyebath when the bath temperatures has reached 140°F. The bath is raised to the boil and boiled for two and one half hours. It is then cooled back, and the bath is dropped. The scouring is carried out with 5% DAP and 1% of a nonionic detergent of the ethylene oxide type at 140°F for ten to fifteen minutes before cooling back and washing off.

B Two-Bath Method: In order to establish laboratory formulations, it is sometimes desirable to establish the shade on the Dacron first and then to set a new bath with 5% DAP and to dye the wool to shade. The same procedure should be followed as in (A) above except that the wool colors are not added. When the Dacron is on shade and has been scoured, the bath is reset with the 5% DAP and the wool dyestuffs.

Two-bath procedures may also be used on certain light shades where staining of the wool by the acetate dyestuffs causes poor light fastness. In the two-bath method, steps can be taken to ensure as little wool staining as possible.

FASTNESS PROPERTIES——It is desirable that, regardless of the method employed, the high standard set by the woolen and worsted industry should be maintained. This can be done by the proper selection of dyestuffs and shades. Light shades present few problems when proper dyestuffs are selected, and heavy shades readily pass most tests. In addition to the proper selection of dyestuffs, other items which have a bearing on fastness are the length of the dyeing cycle and the final scour. Sufficient boiling time insures less loosely held color, and a thorough scour will remove any excess color remaining. The use of a dry cleaner also assists in increasing fastness properties.

As a general rule, most yellows are weak to alkaline perspiration on Dacron, but are good to sublimation and dry cleaner spotting (Tri- or Perchlorethylene); most reds and violets are weak to sublimation but good to perspiration and dry-cleaner spotting; and most blues are weak to dry-cleaner spotting but good to perspiration and sublimation. Certain dyestuffs show the best fastness in all counts, including light, and should be employed. We have found our best results on the wool were obtained with the neutral-dyeing metalized dyestuffs, such as the Capracyls, Cibalans, Irgalans, Supralans, etc. However, neutral-dyeing acid or chrome types may be used. In general, any fast-to-light Dacron dyestuff showing good fastness to sublimation, perspiration, and dry-cleaner spotting may be employed with results which will equal or better those obtained on all-wool or worsted menswear fabrics.

TABLE II
EFFECT OF HEAT PLUS ACIDULANT ON pH VALUES

Elapsed Time minutes	Temperature No 2a	Temperature No 2b	pH No 2a	pH No 2b
0	room	room	7.8	8.2
15	210°F	151°F	7.6	8.1
30	boiling	boiling	7.4	7.8
45	boiling	boiling	7.2	7.4
60	boiling	boiling	7.0	7.2
75	boiling	boiling	6.7	7.1
90	boiling	boiling	6.6	7.0
105	boiling	boiling	6.4	6.8
120	boiling	boiling	6.2	6.6
135	boiling	boiling	6.2	6.6
150	boiling	boiling	6.0	6.5
155 (+ 1.0 ml acid)	boiling	boiling	—	6.2
160 (+ 2.0 ml acid)	boiling	boiling	—	5.2
165 (+ 2.0 ml acid)	boiling	boiling	—	4.6

No 2a is No 2 of Table I plus 5 g $(NH_4)_2SO_4$ in 1 liter of soln.
No 2b is No 2 of Table I plus 5 ml of 28% acetic acid, added in portions of 1 ml, 2 ml, and 2 ml, respectively, at 5-minute intervals beginning after 150 minutes has elapsed.

ACKNOWLEDGMENT

The pH-curve data were contributed by the Research Laboratories of the Victor Chemical Works, Chicago Heights, Illinois.

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• NEWS OF THE TRADE •

• Hart Products Completes $100,000 Expansion Program

The Hart Products Corp, 1440 Broadway, New York, N Y, has completed a $100,000 expansion of its Jersey City, N J, plant. Installation of modern all-stainless-steel pressure equipment for the manufacture of nonionic surface-active agents and other ethylene oxide condensates was recently accomplished. This new manufacturing unit is fully automatic and equipped with modern safety devices and controls for maintaining exact specifications during manufacture.

With this latest addition of equipment, Hart will supplement its list of products with a diversified line of nonionic detergents, wetting agents, emulsifiers and, in general, "specification surfactants."

• Cyanamid Completes Wear and Wash Tests on Corduroy

A year's wear and wash tests of a variety of corduroy garments have been completed by American Cyanamid's Textile Resin Department. The corduroy garments, made up half of untreated and half of corduroy treated with Cyana Permel Plus Finish, were subjected to the active destructive forces of boys and girls of various ages, and worn and washed through a cycle of twenty wearings.

According to Cyanamid, the differences in the two halves of the garments were considerable. The Permel Plus-treated corduroy is said to have retained most of its original appearance, the color, pile and body being relatively unaffected, while the untreated half was faded, worn in appearance, had apparently undergone some fiber loss in washing, and showed signs of failure and exhaustion of the pile at points of wear, after the strenuous test.

• National Aniline to Manufacture Diisocyanates

Construction is nearly completed for the production of diisocyanates in introductory commercial quantities at the Buffalo plant of National Aniline Division, Allied Chemical & Dye Corporation. The new installation is expected to be on stream during the first quarter of this year. All raw materials needed for the production of diisocyanates will be provided by various divisions of Allied Chemical.

Products to be produced will include 2,4-tolylene diisocyanate, various mixtures of isomeric tolylene diisocyanates (TDI), 3,3' bitolylene 4,4' diisocyanate (TODI) and p,p' diphenylmethane diisocyanate (MDI). Experimental quantities of these materials will be made available shortly from smaller semiplant facilities also located in Buffalo.

Metro-Atlantic, Inc, Centredale, R I, has added two new resins to their Emboset series, namely, Emboset Loclor, a low-chlorine-retentive product, and Emboset NR3, an improvement over Emboset NR. Further details will appear in the Reporter of Feb 14th.

• Hallett to Speak at 6th Cotton Research Clinic

H K Hallett, vice president and general manager of the Cotton Mills Division of the Kendall Company, will address a dinner session of the National Cotton Council's Sixth Cotton Research Clinic.

M Earl Heard, vice president in charge of research for the West Point Manufacturing Co, will again serve as general chairman for the Clinic, which will be held at Pinehurst, N C, February 16-18.

During the three-day meeting speakers from industrial, government laboratories, and private research organizations will discuss latest developments in cotton mechanical processing and the applicability to actual mill operation.

• Du Pont Awards Textile Project to NCSC

The Du Pont Company has awarded a major project in textile fiber research to the School of Textiles, North Carolina State College. In a two-year study the college's Department of Textile Research will develop comparative data on Du Pont's five man-made fibers for the engineering of fabrics in specific end uses.

The physical properties of each of the fibers — rayon, acetate, nylon, "Orlon" acrylic fiber, and "Dacron" polyester fiber —will be measured under a wide range of conditions of temperature and humidity. Tests will be conducted on filament yarns and staple. They will include measurements of properties under various loads, properties under impact, moisture content, stress-strain behavior, work an dtensile recovery, properties after exposure to various chemicals, and properties after exposure to heat.

The research project will be supervised by John F de Bordenave and Donald J Bringardner of the customer service section, Du Pont Company's Textile Fibers Department. William T Waters, of the Department of Textile Research, N C State College, will conduct the program under the direction of J F Bagdan, director of processing research at the college.

• Hess, Goldsmith Acquires Full Ownership of Glass Fabrics Finishing Corp

Hess, Goldsmith & Co, reputedly the world's largest weaver of fiber glass fabrics, has acquired full ownership of Glass Fabrics Finishing Corp, Cedar Grove, N J, from Waldrich Co, Delawanna, N J, with which it had previously shared ownership.

Glass Fabrics Finishing Corp was established early in 1953 to meet the finishing requirements of a rapidly expanding glass weaving industry. Since that time it has greatly increased its capacity and is currently fully equipped to provide all commercial finishes for glass fabrics, including Coronizing. In addition, it has set up an independent research laboratory devoted to the development of new treatments and finishes for industrial and decorative glass fabrics.

The appointment of Edwin L Lotz as general manager of Glass Fabrics Corp has been announced by Raymond F Clark, vice president of the industrial products division at Hess, Goldsmith. Dr Lotz, a pioneer in the development of fiber glass, was formerly director of research for the Irvington Varnish and Insulation Division of the Minnesota Mining Co.

Pictured at the left are the models who introduced Lanolized hosiery in France recently. Transocean of Paris is the firm handling the special finished hosiery in Europe. A special fashion show was presented and more than 600 members of the European fashion trade attended. "Miss Europe" of 1954, seated at the right in the photo, was the featured model in the show.

• General Plastics Begins 5th Year

General Plastics Corp, Paterson, N J, recently entered its fifth year of operation under the leadership of Robert Goldsmith, who founded the firm in November, 1950, for the purpose of working with Teflon, primarily as a coating.

Although Teflon has numerous applications throughout industry in general, one of the largest single fields in which it has produced outstanding results is the textile industry. Due to its non-adhesive characteristic, Teflon has found application as a coating on such diversified items as slasher cylinders, dry cans, filling grates, etc. It has facilitated the use of new sizing and finishing compounds, and has aided production by eliminating or reducing cleaning time and reducing "spoilage."

The application of Teflon to metal requires more than simple plating. First, the metal must be thoroughly cleaned, after which a primer is sprayed on and baked in a 700-degree oven. (Teflon sinters at 620°F). Next, one or more coats of Teflon enamel are applied after the primer, each of which has to be baked separately. Each coat is usually hand rubbed so that the finished job is perfectly smooth.

Mr Goldsmith worked initially with Teflon while doing research work for a ceramic coating for Signal Corps applications. At the time he was a member of the Signal Corps Advisory Committee working with Squier Laboratory at Fort Monmouth, N J, and Rutgers University's Ceramic Department. When he decided to go into business he chose Teflon since it was a comparatively new item with a large, varied field of applications, offset by a lack of any real experience in the application of the material. One of the great difficulties at the start, and to a large extent, at the present time, is that every application of the material is different, ie, each user of Teflon has to be educated to some degree, in its capabilities and special handling requirements. As a result, a large part of General Plastic's business is an engineering service, which requires considerable sampling and prototype work before production is undertaken.

General Plastics' first shop in Clifton, N J, was slightly under 4,000 sq ft and was equipped with electric ovens, a spray booth and a few spray guns. This was soon outgrown, and in the summer of 1953 the firm moved to its present quarters at 165 Third Avenue in Paterson. The new building comprises just under 17,000 sq ft. At the present time there are five spray booths in operation, each with its own exhaust, liquid honing, and grit blasting, degreasing, pickling, and other surface preparation facilities for the proper cleaning of the metals. The electric ovens have been augmented with larger gas and electric ovens so that pieces up to 10½ feet long can be hung while the Teflon is fusing to prevent deformation. Longer pieces with cross sections up to 6½ feet can also be accommodated. High-frequency heating equipment and other high speed heating facilities have been installed and just recently, automatic spraying equipment for large production runs have been added. Physically the plant is laid out to handle almost any conceivable piece of equipment for coating.

• British Industries Fair Planned for May

The British Industries Fair, one of the biggest national trade fairs in the world, is scheduled for London and Birmingham, England, from May 2-13.

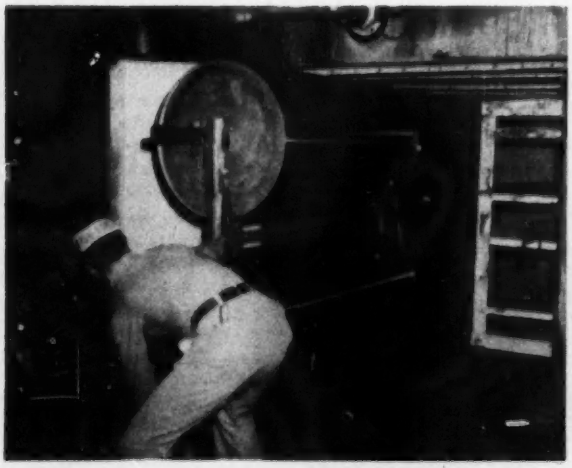
Heavy industry will center at Castle Bromwich, Birmingham, and consumer goods at Olympia Hall, London.

The textiles and clothing group will feature yarns and fabrics, made-up goods (men's, women's and children's wear), and domestic and decorative textiles.

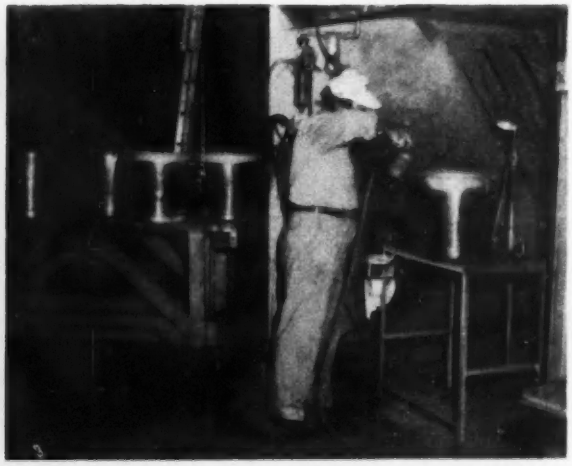
Chemicals, not featured last year, will have a stand.

Applications by those interested in attending the XIVth International Congress of Pure and Applied Chemistry, to be held July 21-27 in Zurich, Switzerland, must be in to the Organizing Committee by February 15th. Applications should be sent to the Secretary General of the Congress, Dr R Morf, Zurich 1, Switzerland.

Hand rubbing after each coating insures smoothness. (GPC's Bob Goldsmith—center).



The baking process follows each coating with Teflon.



Primer is sprayed on dye pails prior to their coating with Teflon.

NAMES IN THE NEWS

Miller

White

Schulze

Jutras

Dillon

I. M MILLER has been appointed eastern regional sales manager for the Chemical Division of Armour and Company, with headquarters at North Bergen, N J. Mr Miller, formerly manager of the division's Market Development Department in Chicago, succeeds the late KENNETH E JOHNSON.

E L. RHOADS, JR, assistant manager of the Derivatives Department, succeeds Mr Miller as manager of market development. R E EDDY will assume Mr Rhoads' position in the Derivatives Department.

CHANDLER T WHITE, vice president of General Aniline & Film Corporation, and manager of operations at the Company's dyestuff and chemical division plant in Rensselaer, N Y, will take over new duties in New York. In his new post, Mr White, a veteran of over 30 years of service with GAF, will assume responsibility for the Company's industry and trade relations, working in association with JOHN H HILLDRING, executive vice president, in this activity.

C C SCHULZE, presently production manager at the Company's Linden, N J, plant, will succeed Mr White as manager at Rensselaer, and MICHAEL WITTE, who recently has been acting production manager at Linden, will become production manager there.

EDWARD F SWANEZY and M HENRY JAMISON have been promoted to new sales administrative positions within the Chemical Division of Celanese Corporation of America.

Mr Swanezy, formerly sales representative in the New York metropolitan area, is now sales manager of the Chicago District, succeeding R J WERNER who has been transferred to New York headquarters to assume new and expanded duties.

With the establishment of a new District Sales Office in St Louis, Mr Jamison becomes sales manager for that territory. Previously, he had been assigned direction of the St Louis area as a part of the Chicago District sales territory.

WILLIAM J JUTRAS, JR, formerly a senior organic chemist with Warwick Chemical Co, has joined the staff of Gagliardi Research Corp, East Greenwich, R I, as a research Chemist.

Prior to his service with Warwick, Mr Jutras was employed at a textile chemist at Cranston Print Works.

JOHN A FYFFE has been appointed a sales representative for Hooker Electrochemical Co, Niagara Falls, N Y.

After a short period at the Niagara Falls plant, Mr Fyffe will work from Hooker's New York district sales office in the Lincoln Building, New York, under the supervision of HARRIS C MILLER, New York district sales manager. He will handle accounts in the Greater New York Metropolitan area.

WILLIAM L ABRAMOWITZ, formerly executive manager of Borden's Polyco Department at Peabody, Mass, has been named a vice president of the Borden Company's Chemical Division.

The general manager of the Peabody operation (known as the American Polymer Corp before Borden's acquired it in 1953) will be SIDNEY J BAUM, who has served there since 1945.

Mr Abramowitz founded American Polymer Corp in 1945, and was a director until the acquisition. He was treasurer of American Monomer Corp from 1950 to 1954.

JOHN H DILLON, director, Textile Research Institute, Princeton, N J, is to receive the Harold De Witt Smith Memorial Medal for 1955. This is the sixth award of the medal by Committee D-13 on Textile Materials of the American Society for Testing Materials.

The medal will be presented to Dr Dillon at a luncheon in his honor on Thursday, March 17, during the spring meeting of Committee D-13, March 15 to 18, at the Statler Hotel, New York City.

The medal is a testimonial to the memory of the late Harold De Witt Smith who pioneered in the concept of an engineering approach to the evaluation of the properties of textile fibers and to their utilization. It was endowed by Fabric Research Laboratories, Inc, Boston and is awarded at intervals of not less than one year by Committee D-13 for outstanding achievement in research on fibers and their utilization.

Announcement has been made by E F Houghton & Co, Philadelphia, Pa, of the appointment of KURT C FRISCH as assistant manager of research.

Dr Frisch has been supervisor of organic research in the Houghton Laboratories since 1952. He will be succeeded in that position by ELLIS ABRAMS, former supervisor of textile research at Quaker Chemical Products Corp.

CHARLES W DORN, research laboratory director, J C Penney Co, and chairman of AATCC's Technical Committee on Research, was honored at the recent convention of the National Retail Dry Goods Association.

Mr Dorn, chairman of NRDGA's technical Committee, was one of five recipients of the NRDGA Silver Plaque Award for his "important and material contributions to the standardization of textiles and yarns to the ultimate benefit of the American consumer".

Others honored were ROBERT J DOOLAN, director of personnel, Allied Stores Corp; BEN R GORDAN, executive vice president and general manager, Rich's, Inc; B A GRAHAM, president, Sunbeam Corp; and HARRY I MARGULES, controller, Gimbel Bros.

• Randedare Durable Water Repellents

Metro-Atlantic, Inc, Centredale, R I, has introduced a new series of durable water repellents, the Ranedare series, to meet the specific demands of the industry. (See page 35A). Each product in the series reportedly has been formulated with high shelf life, easy running properties with low foam, and excellent dilution and mixing properties. They are said to produce a dry "hand," and it is claimed that their use will keep yellowing and tensile strength losses at a minimum.

Ranedare R for synthetics has been designed specifically for use on synthetic fabrics with crease resistant and stabilizing effects to provide durable water repellency, shrinkage control, wrinkle- and spot-resistant effects. Finished effects are said to be extremely durable to drycleaning and washing. This product is versatile in that the hand and finish can be varied to suit most any fabric.

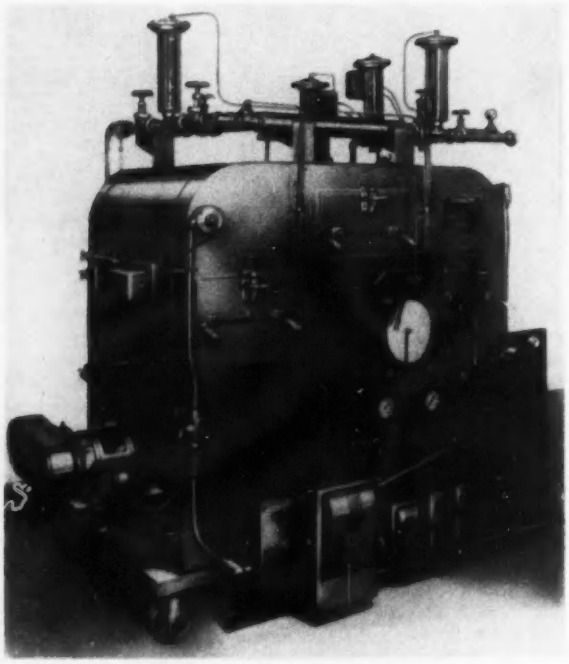
Ranedare C has been designed to produce durable water repellent effects on cotton. Finished effects using Ranedare C are said to be extremely durable to drycleaning and washing.

Ranedare S is a silicone for synthetics. This product is one of the first durable materials formulated from General Electric's "Dry Film", a silicone which is said to produce free flowing and to be easily diluted in cold or warm water. The Ranefix Catalyst for Ranedare S also is said to be free flowing and easily diluted in the finishing bath without predilution, eliminating water-repellent spotting. This product reportedly produces a very soft finish with top durability to drycleaning. It is said to work exceptionally well on such fabrics as velvet and sheers, and in other cases where other durable water repellents fail. It is also said to have high durability to consecutive washings as well as to drycleanings. In addition to its performance on synthetics, it is said to work especially well on cotton and wool. Both the Ranedare R and Ranefix are considered to have high shelf-life and do not require excessive curing for polymerization.

Garment tags will be available at the customer's request.

• Portable Lab Dryer

C G Sargent's Sons Corporation of Graniteville, Mass, has introduced a new, portable, completely self-contained dryer, available to industry and to university laboratories on a rental, a rental-purchase, or outright purchase basis.



C G Sargent's Sons Portable Lab Dryer

It is believed to be the first such machine to incorporate every known feature of a research laboratory dryer with the advantage of portability. This new dryer is full-size and fully instrumented. It uses either steam-heated or electrically heated air. The heavy duty ball bearing casters on which it is mounted lock when dryer is positioned at the job or in the laboratory. After the usual steam and electrical connections have been made, the dryer is ready to go to work.

The dryer is equipped for tray drying, or for pole, roll or plate drying, as desired. All gages, valves, control and recording instruments and charts are mounted on the face of the dryer to make it an integrated, self-contained unit. It may be operated manually or automatically, or in combination, and each variable, including air velocity, in the drying process may be changed at will without disturbing any other factor.

• Harto-Resin PC

The Hart Products Corp, 1440 Broadway, New York 18, N Y, has announced the development of a new polyvinyl acetate emulsion, Harto-Resin PC. The resin is said to be an exceedingly versatile emulsion giving a durable finish which requires no curing. The films are glass-clear, colorless, and the finish reportedly shows the maximum stiffness of all such resins examined.

Harto-Resin PC is used as a durable finish for nylon hosiery, for finishing ribbon fabric, as a durable anticurl for nylon tricot, as a crisp finish for cotton and rayon, and, in general, as a durable clear, stiff finish for all fabrics.

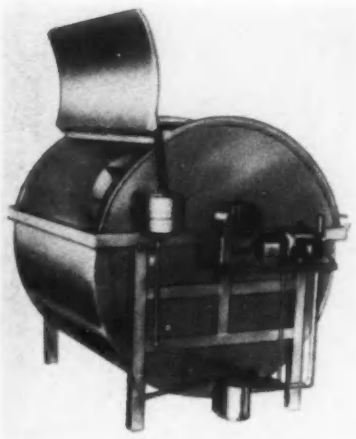
• Apex Introduces New Chemicals

Four new textile chemical specialties were revealed recently at the annual sales meeting of Apex Chemical Co, Inc, 225 West 34th St, New York, N Y.

Presented were: Antistat #93, a durable static eliminator for Dacron, nylon and other synthetics; Bondapex #1020, a finish to be mixed with resins to overcome the flat, harsh feel of resin-treated goods; and Duradul, a nonpowdering delustant for all fibers with wide compatibilities.

Antistat #93 is said to be nonremovable in drycleaning, and Bondapex #1020 reportedly renders a full, round hand on resin-treated goods.

Duradul is made in two grades for use on either white or black fabric.



KWG Paddle-Wheel Dyeing Machine

• Automatic Opening Cover for KWG Dyeing Machine

Klauder Weldon Giles Machine Company, Philadelphia, Pa, has introduced an improved cover design for their paddle-wheel-type dyeing machine. The large front door of this cover is counter balanced for automatic opening, substantially easing the operator's work and eliminating the danger of handling a heavy cover over a hot dyebath.

The new cover is now available on all paddle wheel dyeing machines manufactured by the Klauder Weldon Giles Company in sizes from 20 to 500 pounds.

• Niatex Anti-Static AG-1

Niatex Anti-Static AG-1, a durable antistatic for use on synthetic fabrics, is applied by padding and fixed on the fabric by heat treatment. It is said to give lasting antistatic protection even after repeated washing and drycleaning with little or no effect on the hand of the fabric. Anti-Static AG-1 reportedly can be applied in conjunction with crease-resistant or water-repellent finishes.

The material is now available in commercial quantities from Carbide and Carbon Chemicals Company, 30 East 42nd Street, New York 17, New York.

• R-300 Textile Finish

A new "R-300" textile finish, claimed to reduce formaldehyde after-odor to the vanishing point, has been announced by Jersey State Chemical Co, 59 Lee Ave, Haledon, N J.

R-300 is said to permit crisp finishing of nylons with much lower after-odor and finishing room odor, but without any increase in cost over ordinary finishes. It requires no special processing.

In addition to the negligible odor factor, the manufacturer claims that R-300 provides better results in terms of finish, hand, durability and washability.

• Diazophenyl Fast Green GLN

Under the designation Diazophenyl Fast Green GLN, Geigy Dyestuffs Div of Geigy Chemical Corp, 89 Barclay St, New York 8, N Y, is offering a new green which, when developed with Developer Z, is said to produce very attractive shades on cotton, rayon and silk.

The new green is said to be characterized by its excellent resistance to light. Other features are said to be its good fastness to washing, excellent discharge properties (both neutral and alkaline), reservation of acetate, and retention of light fastness after crease-proof finishing.

Geigy recommends the new color for dischargeable ground shades, and suggests its use in the dyeing of cotton and rayon hosiery, cotton knit goods, cotton yarns, and dischargeable wash fast shades on real silk.

Copies of Bulletin 63G, covering this product, are available from the manufacturer.

• Catalyst AC-6

Development of a fast-action, low-cost catalyst for resin finishing textiles was announced recently by Monsanto Chemical Company's Plastics Division.

Designated Catalyst AC-6, the new material is said to have a curing efficiency 20 to 25 percent higher than other members of Monsanto's "AC" catalyst series, and it is available at substantially lower cost.

Sawyer F Sylvester, manager of textile resin sales, has reported on a number of successful mill runs in which cotton fabric was embossed with Catalyst AC-6 catalyzed formulations of Monsanto's Reslooms M-80 and E-50 and softener. Identical fabrics were embossed with similar formulations of resin, but using other catalytic agents.

In all cases Catalyst AC-6 reportedly outperformed the others in terms of emboss durability, glaze retention (three AATCC standard cotton washings) and wrinkle recovery. Emboss quality, tear strength and tensile strength were said to be approximately equal.

In addition to its increased catalyst activity and comparatively low cost, Mr Sylvester cited these other advantages of the new material:

1) Long bath life (uniformity of resin application, minimum resin bath waste).

2) Minimum danger of odor formation.

3) Fuller development of optimum fabric properties (maximum performance, minimum resin add-on).

Copies of a new technical bulletin on Catalyst AC-6 are available on request: Department SA, Monsanto Chemical Company, Springfield, Mass.

• National Blue 3BVS Salt

National Blue 3BVS Salt, the latest addition to National Aniline Division's line of stabilized diazonium salts, is used to produce, on cotton or viscose rayon, a range of shades varying from greenish to reddish blue with the various National Naphthols. Most of these colors reportedly exhibit very good to excellent fastness to light, washing, soda boil and other wet processing.

National Blue 3BVS Salt may be applied on the continuous padding range, in pressure package-dyeing machines, and in open tubs. National points out its suitability for application by the various printing processes and reports that many of the combinations can be discharged to excellent white with hydrosulfite discharge pastes. This product is highly recommended by the manufacturer for coloring materials for sport and work clothes, children's play clothes and materials that are to be resin-finished. It is noted that couplings with selected National naphthols produce blue shades of excellent light fastness.

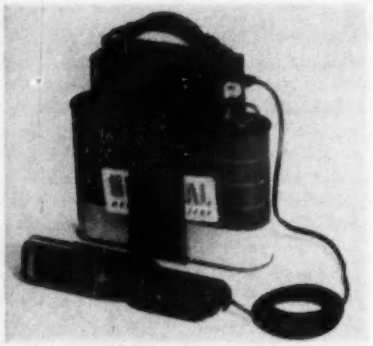
• Greater Diameter Roll for Air Guiders

A new development in the air guider field is the use of a 2¾" rubber cradle roll instead of the 2½" O D roll which has been considered standard on air guiders. It is claimed by the Guider, Roll and Service Company of Daytona Beach, Fla, that the new, larger size roll is much more economical than the smaller roll because it has to be re-covered less frequently.

The company is now marketing the new roll, which has an outside diameter of 2¾", and an inside diameter of only 1¼". This gives the larger roll ¾" of rubber all around. Although the larger size roll is slightly more in cost, it is said to be economical to regrind in the event that it becomes "grooved," "shouldered," or "coned" in service. The new roll is made with a shaft to fit the cradles of all air guiders.

Robert Hetherington, head of the company, states that, in addition to supplying the new rolls for all makes of existing guiders, they will equip their own guiders, air, electric and mechanical, with the new, larger rolls.

2¾" rubber cradle roll now being used by Guider, Roll and Service Co on their guides



Model SL 3660 long wave Mineralight Ultra-Violet Lamp

• Portable Mineralight Ultra-Violet Lamp

A new Mineralight long-wave ultra-violet lamp with important applications particularly adaptable to the textile industry, was recently announced by Ultra-Violet Products, Inc, South Pasadena, Calif.

When directed at certain substances, the invisible "black light" rays cause fluorescence, whereby these substances radiate a color different from their own. Thus variations that are invisible, or nearly so, in ordinary white light, are said to stand out with startling clarity when exposed to ultra-violet. This makes the lamps useful for observing, analyzing and comparing materials, weaves, and dye lots; inspecting for flaws and variations; "invisible" marking during manufacture; locating oil spots on fabrics and tracing to their origin; and displaying and merchandising manufactured items.

Mineralights are Underwriters' Laboratories approved. The new unit consists of a Model SL 3660 long wave Mineralight for AC operation, and a 6-volt adapter for use with a portable "hot shot" battery or other 6-volt source.

• Emulsifiable Type A-C Polyethylene

Emulsifiable type A-C Polyethylene, which may find application as a liquid coating for textiles, is now available in limited quantities for evaluation on plant run scale. It is reported that small particle size, stable, clear, high-solids-content emulsions are readily obtained with this easily emulsified material.

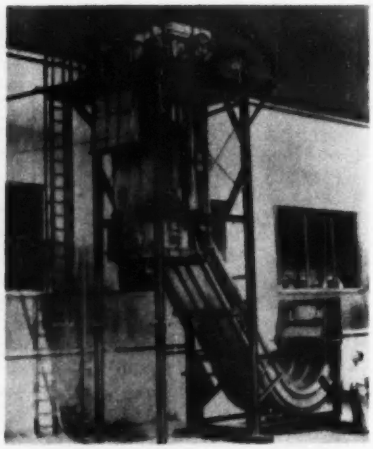
Prices are quoted delivered in the United States and range from 40 cents to 52 cents a pound depending upon grade and quantity. A complete list of A-C Polyethylene prices effective January 1, 1955, and additional information may be obtained from Semet-Solvay Petrochemical Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, New York.

• New Method for Discharge Printing Acetate

A new method for producing discharge effects on acetate has been announced by Interchemical Corporation, Textile Colors Division, Hawthorne, N J. The new method is said to have been employed successfully on a commercial scale for producing attractive discharge prints in a wide range of clean, bright shades which cannot be obtained by conventional methods. They include brilliant shades of blue, green, aqua, turquoise, yellow, orange, and red.

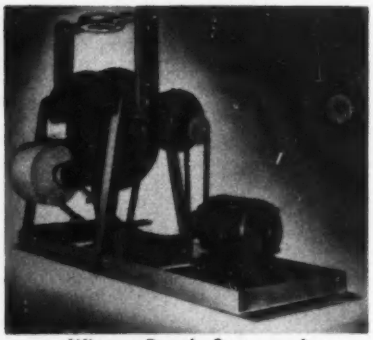
Selected Aridye® Colors and specially formulated clears are employed for producing the discharge effects on acetate grounds dyed with dischargeable Interchem® acetate dyes. This new method reportedly has proved useful on a wide range of acetate fabrics for dress goods and other uses.

It is stated that, with a modification of this method, the same excellent results can be obtained on rayon, spun rayon, and cotton.



Pictured above is one of the largest open-width bleaching range J boxes ever built. Standing 28' high and 55' wide, it holds about 4000 lbs of fabric. It stands 32' high with its bonnet cover open, and is 21' long from front to back. Erected by Rodney Hunt Machine Co, the J box was delivered last year to a prominent U S mill where it has been installed in an 80' long single-stage bleaching range, which is said to continuously bleach desized fabric at speeds up to 6000 yards per hour. The range includes six open-width Tensitrol washers and saturators. Grey goods are first given a wash and caustic treatment in three of these units located in advance of the J box, and then are piled in the J box. Upon leaving the J box, the goods are neutralized and washed in the remaining units.

This J box, a DuPont type, has a full open-width, stainless steel heater tube system for pre-heating the goods as it enters the stainless steel storage chamber. Provisions have been made in the design for full access to the interior for inspection and cleaning. The suspension of the storage units is said to allow for full thermal expansion without adverse effect on seals or rotating shafts.



Wiesner-Rapp's 3-way reel

• Improved 3-Way Reel

An improved 3-way reel has been announced by Wiesner-Rapp Co, Inc, Buffalo, New York.

Made up of standard interchangeable stocked parts, these reels can be furnished as a basic unit, idler reel, as a driven type reel and as a drag reel by addition of a rubber covered rider roll. When furnished as a driven or drag reel, they can be supplied with or without either drive motor and/or speed reducers.

Other outstanding features are large diameter stainless steel flanged drum type reel, welded steel framework which supports the various parts in a compact integral unit, stainless steel pot-eye that can be positioned through an 180° arc, heavy duty reducing unit and a standard drive motor. Large surface contact between the reel and rider roll is designed to insure an even pull without distortion.

• CSL-A Abrader

Custom Scientific Instruments, Inc, Arlington, N J, is offering the CSL-A Abrader, which determines the resistance to abrasion of flat surfaces of material, measured in terms of volume loss.

Essentially, the machine consists of two independent units: 1) a vertical track which carries the prepared specimens around to meet the abrasive, and 2) a carriage which rests on roller bearings and has provision for keeping a strip of abradant in continuous motion while abrading the samples. The directions of motion of the abradant and samples are opposite, and contact between the two is maintained by dead weights attached to the carriage by a cable-spring-pulley arrangement.

The following advantages are claimed for the instrument: moving abrasive, heat dissipation, alternate and intermittent, periods of abrasion, range of application, and directional abrasion.

The capacity of the abrader is 6 to 8 test specimens depending upon the number of calibration zinc specimens. The size of the sample tested is ⅞" x 2¼". The abradant width is 1" in 50-yard rolls.

TECHNICAL LITERATURE

(This is an alphabetical list of some of the outstanding technical literature which has appeared recently. Unless otherwise indicated any literature appearing in this listing may be obtained free of charge from the supplier upon written request.)

A PRELIMINARY STUDY OF THE DYEING OF CYANOETHYLATED COTTON ——— *American Cyanamid Co, Dyestuff Dept, Bound Brook, N J*———This comprehensive article by F Fordemwalt and R E Kourtz is fully illustrated with graphs and colored photographs. Included in the discussion are sections on Differential Dyeing Tests, Vat Dyes———Exhaustion and Color Value; Penetration; and Stability of Treated Fiber. Seven references are cited. Appendices include those on Differential Dyeing Tests, Laboratory Methods for Applying Vat Dye to Cyanoethylated Cotton, Effects of Various Dyeing Processes on Cyanoethylated Cotton, and Modified Kjeldahl Method———Description of Equipment.

ABRASION DAMAGE OF TEXTILE FIBERS ———*U S Quartermaster Corps (1954); 41 pages, with photographs, diagrams, graphs, and tables; available from OTS, U S Department of Commerce, Washington 25, D C (Room 6227, Commerce Building.) $1.00. Code No of Report, PB 111408*———Research described in this report from the Army's Quartermaster Corps has led to a new criterion for evaluating the functional performance of textile fibers: "Inherent abrasion damage." Twenty-seven multifilament and staple yarns were tested under a new method developed for use with Stoll-Quartermaster abrasion tester described in PB 98014 ($1.25). Abrasion damage was measured quantitatively by the fiber fineness (grex) destroyed in flexing around a steel bar. Much greater differences were observed in the inherent abrasion damage of these fibers than would be expected from the differences in their tensile tenacity. Test equipment and procedure is detailed and the results tabulated. A special section discusses factors preventing abrasion damage. (BTR Vol 22, No 3, p 137.)

ALCOLAC'S GROWTH, PRODUCTS AND SERVICES———*American Alcolac Corp, 3340 Fairfield Rd, Baltimore 26, Md*———A background of American Alcolac Corp, manufacturers of synthetic detergents.

ALKYL HALIDES———*Aceto Chemical Co, Inc, 40-40 Lawrence St, Flushing 54, N Y*——— The bulletin describes the alkyl chlorides of various chain lengths (myristyl, C-14, cetyl, C-16, and stearyl, C-18).

Also described are the alkyd bromides ranging from C-10 to C-18 chain lengths (decyl, C-10, lauryl, C-12; myristyl, C-14, cetyl, C-16; and stearyl, C-18).

BURLING BULLETIN 105—*Burling Instrument Co, 16 River Rd, Chatham, N J*———This is the fifth in a new series describing Burling's line of temperature controls. Models VD-25, VD-2C, and VD-2X are described. Each of these is a dual temperature control, incorporating two independent electric switches for operation up to 1800°F. These models differ only in type of enclosure———standard, weathertight, or explosion proof.

All operate by the differential expansion of solids (two concentric tubes) and use no filled bulb or capillary tubing. Standard switches are rated 15 amp, 125-250 volts, a c, and are actuated by the tube expansion through a lever.

CARBIDE AND CARBON CHEMICALS FOR THE TEXTILE INDUSTRY (F-8679A)———*Carbide and Carbon Chemicals Co, 30 East 42nd St, New York 17, N Y*———This booklet is designed to furnish a review of Carbide's newer developments in textile chemicals. These products include: antistatic agents, chemicals for dyeing, chemicals for fiber synthesis and modification, intermediates for resin finishes, surface-active agents, and water-soluble lubricants.

CARBIDE AND CARBON TECHNICAL BULLETINS———*Carbide and Carbon Chemicals Co, 30 East 42nd St, New York 17, N Y*——— Among the latest technical bulletins released by Carbide are the following:

F-7370—Ketosol solvent 75, a mixture of acetophenone and phenyl methyl carbinol. It is said to be an excellent dye carrier for Dacron polyester fiber and blends of Dacron with wool and viscose.

F-8085—Diethylene glycol and triethylene glycol.

F-8307—Ethylene carbonate and propylene carbonate (Uses: intermediates for the preparation of synthetic resins, spinning solvents for synthetic fibers, specialty solvents, etc.

F-8327—Ethylene glycol.

F-8596—Ethyl benzene.

Information is given on physical, chemical and physiological properties; specifications; suggested applications, etc.

CERTAIN PROPERTIES OF BATH TOWELS ———*Florence E Petzel, Bulletin No 18, September 1954, Department of Clothing, Textiles and Related Art, School of Home Economics, University of Alabama, 16 pages*———This is one of a series of bulletin reports from the research program of the Department of Clothing, Textiles and Related Art, University of Alabama, Prof Henriette M Thompson, head of the Department. This study deals primarily with the construction, weight, breaking strength and shrinkage of 18 kinds of white cotton bath towels.

When towels of the same weave structure made from single and two-ply ground warp yarns were compared, the warpwise breaking strengths were not significantly different; however, the fillingwise breaking strength of towels made from ply ground warp yarns was markedly higher than that of towels made from single ground warp yarns. Apparently the number of yarns per inch was the major factor in the difference.

High weight per square yard and high thickness were associated with high breaking strength. Shrinkage was relatively high in the warpwise direction and low in the fillingwise direction. In a few cases where decorative borders were present, shrinkage in width at the borders was sufficient to cause puckering. No significant relationship was found between price per towel and and breaking strength, and there was little relation between price and shrinkage.

CHEMICALS FOR TEXTILES———*(Bulletin No 89), Research Information Service, 53 Nassau St, New York 38, N Y*———Contains prices and abstracts for English translations of a large number of hitherto unpublished German patents, patent applications, and manufacturing processes for textile auxiliaries.

The bulletin is divided into two main sections: a) surface-active agents, and b) finishing agents & other aids.

CLEAN WATER—AND HOW TO GET IT ———*General Electric Co, Schenectady 5, N Y* ———This two-color, 34-page bulletin, designated GEA-6096, is designed to help civic leaders, municipal officials, and sewage treatment experts dramatize to their communities the urgency of providing proper sewage treatment and how to get it.

It contains facts on water pollution, a four-step course of community action to fight pollution, examples of successful municipal campaigns, and methods of maintaining public support for such programs.

COMBINED TORSION AND BENDING IN ROLL SHAFTS———*Report #4, Rodney Hunt Machine Co, Dept IR, Orange, Mass*———One of a series intended to assist in the design and selection of rolls for specific plant applications.

Dealing with torsion or twisting action of a shaft and combined torsion and banding, two basic formulas and typical examples for calculating torque and shearing stress are presented. How to compute the maximum allowable stress for good design and the service factor which is significant with respect to gradual or shock loads, is explained in the report.

CONCERNING A DYNAMIC EQUIPMENT POLICY FOR THE TEXTILE INDUSTRY———*H W Butterworth & Sons Co, Bethayres, Pa*——— This is the first of a series of short, nontechnical articles on the wet finishing of textiles. It deals with a dynamic equipment policy that is having a major influence on the industry.

Subsequent articles will discuss recent developments in machinery for drying, bleaching, dyeing of synthetics, continuous dyeing, and laboratory use.

DAVIS-BRUNING COLORIMETER———*(Bulletin FS-246), Fisher Scientific Co, 717 Forbes St, Pittsburgh 19, Pa*———Explains the use and theory of a new additive colorimeter designed to serve as a permanent "color memory" for control chemists.———8 pages.

DIISOCYANATES———*The Carwin Co, North Haven, Conn*———Product information is given for TODI and DADI, two new isocyanates now available from The Carwin Co in semicommercial quantities. Contents include General Properties, Special Properties, Typical Reactions, Uses, and Toxicity. 13 references to Bibliography.——— 5 pages.

DRESINATE———*Hercules Powder Co, Wilmington, Del*———Information about the use of Dresinate, a series of sodium and potassium salts of various processed resins and tall oil supplied in liquid, dry and paste form. These resinates find application as emulsifying agents, detergent additives, dispersants, foaming and flotation agents, viscosity-control agents, and industrial sizing compounds.

DYEING SYNTHETIC FIBERS—4th Edition (1954)———*General Dyestuff Co, 435 Hudson St, New York 14, N Y*———A comprehensive, detailed analysis of the methods and materials available for dyeing synthetic fibers. As mentioned in the Introduction, old types are being improved and new blends and constructions are being developed, bringing new problems to the dyer and finisher. This Fourth Edition of Brochure GS-66 includes new developments, methods and ideas not included in the previous edition.

EQUIPMENT AND PROCEDURE FOR EXPERIMENTAL CYANOETHYLATION OF COTTON YARN, FABRIC AND FIBERS———*Monsanto Chemical Company, Plastics Div, St Louis 4, Mo*———The bulletin contains text and diagrams showing the cotton cyanoethylation reaction and a complete description of the properties of cyanoethylated cotton.

Safety precautions to be observed when handling acrylonitrile are described in "Chemical Safety Data Sheet SD-31," published by the Manufacturing Chemists' Association, Inc.

FATTY ACIDS IN MODERN INDUSTRY——— *A Gross & Co, 295 Madison Ave, New York 17, N Y*———This 24-page book contains specifications, grades, packing, and stock points on distilled stearic, oleic, coconut, cotton seed, soya and palm fatty acids; as well as information on glycerine, pitch and hydrogenated tallow fatty acids.

FORMOPON IN THE TEXTILE INDUSTRY ———*Rohm & Haas Co, Washington Sq, Philadelphia 5, Pa*———This booklet, No T-7a, gives full details on Rohm & Haas' Formopon, a sodium sulfoxylate-formaldehyde. Contents include: Properties, Chemical Constitution, Uses, Vat Dye Reduction, Printing with Vat Dyes, and Analysis of Sulfoxylates.———12 pages.

GDC CIRCULARS———*General Dyestuff Co, 435 Hudson St, New York 14, N Y*———The following circulars were released by General Dyestuff Corp during the last quarter of 1954:

G-777—Calliton Fast Yellow 4RLA Conc New CF

G-774—Diazanil Orange RR Conc

G-749—Indanthrene Grey GNF Paste

G-782—Indanthrene Navy Blue B Paste

G-784—Chromoxane Brilliant Red BL

G-776—Fastusol Orange L4GU-CF

G-779—Rapidogen Black ITA

G-787—Fastusol Orange L6GU-CF

G-789—Algol Printing Black WW Conc Paste

Each circular contains complete information on properties, uses, application, fastness ratings, etc.

GLYCOLS AND RELATED PRODUCTS——— *Wyandotte Chemicals Corp, Michigan Alkali Div, Wyandotte, Mich*———This 72-page booklet describes the history, manufacturing processes and uses for Wyandotte's ethylene glycol, diethylene glycol, ethylene dichloride, and dichloroethyl ether. Graphs portraying the physical properties are also included.

GRINDING AND MIXING HANDBOOK——*Price: $1.00, Paul O Abbe, Inc, Center St, Little Falls, N J*——This handbook covers every branch of ball and pebble mill operation.

There are chapters on Types of Mills and Linings; Principles of Grinding; Good Milling Procedures; Controls for Better Grinding; and Questionnaires.

The book covers such topics as: Speed of Mill, Quantity of Grinding Media, Type of Grinding Media, Size of Grinding Media, Quantity of Material, Consistency of Material in Wet Grinding, Materials in Dry Grinding, Size of Mill, Jackets, Venting and Pressure in Mills, Cleaning the Mill, Maintenance of Mills, Paint Grinding, "Slip" in Ball Mills.

GURLEY TESTING INSTRUMENTS——*Bulletin 1400, W & L E Gurley, Troy, N Y*——Procedures for various textile tests are described.

Among the tests outlined are standard procedures for determining air permeability with the Gurley Permeometer. The instrument is used for filter fabrics, and measurement of wind-proofness, coating penetration, filler retention, and water resistance of fabrics which permits passage of from 1 to 400 cu ft of air per minute per square foot at a pressure drop of 0.5".

Also described is the operation of the Gurley Densometer for testing porosity, air resistance and air permeability of windproof cloth, garbardine, canvas, poplin and other fabrics below Permeometer capacity.

Among the other instruments in the bulletin is the Gurley Stiffness Tester for determining the stiffness and "handle" of fabric in specific figures, on a sine scale. Its range includes almost all textiles.

HYDROFOL PRODUCTS——*Archer-Daniels Midland Co, Chemical Products Div, 2191 West 110th St, Cleveland 2, O*——This 40-page technical catalog gives complete information on ADM's lines of Hydrofol Fatty Acids, Hydrofol Glycerides, Adol Fatty Alcohols and Sperm Oils. Each section is classified into reaction data, specifications, composition and application information. Working charts and test definitions give the catalog continuous desk-top utility.

A prime use for ADM Chemifats in the textile field is in softeners to give cloth a soft, luxurious texture.

KNIT GOODS BLEACHING RANGE PROCESSES 140,000 LBS WEEKLY——*(Bulletin No. 61), Buffalo Electro-Chemical Co, Inc. Station B, Buffalo 7, N Y*——Full construction and performance details of a 56-foot long continuous bleaching range requiring but two operators, as installed at Union Underwear Co, are presented.

L & N pH CONTROL OF COOLING TOWER WATER——*Process data sheet 700(1), Leeds & Northrup Co, 444 North 16th St, Philadelphia 30, Pa*——Offers suggestions on measurement and control of the pH of cooling tower water, and describes L & N equipment for this application.

The booklet includes conservation of make-up water, wood protection, prevention of scale, and minimization of slime among the benefits of pH control of tower water.

LYKOPON IN THE TEXTILE INDUSTRY——*Rohm & Haas Co, Washington Sq, Philadelphia 5, Pa*——This booklet, No T-9a, affords an up-to-date presentation of Lykopon, a sodium hydrosulfite, including its chemical constitution, properties, methods of analysis, and use in vat and sulfur dyeing.——*15 pages.*

McKIERNAN-TERRY MULTI-PURPOSE CALENDER——*Bulletin T-102, McKiernan-Terry Corp, Textile Machinery Div, Dover, N J*——Explains the exclusive design which enables these machines to be converted from one service to another for use as a friction, Schreiner or embossing calender, and describes additional unusual features of gear train, rolls, bearings and controls. Many details are illustrated by drawings and photographs, and complete specifications for both the 75-ton and 40-ton sizes are also included.

MORPHOLINE——*Jefferson Chemical Co, 260 Madison Ave, New York 16 N Y*——This versatile chemical is described as a colorless, hygroscopic liquid, with amine-like odor. It is derived from hydrocarbon sources. Its solvent power is said to exceed that of benzenes, pyridine, and dioxane. Completely miscible with common organic solvents, it dissolves organic chemicals such as resins, dyes, etc.

Numerous applications have been developed in the textile industry, notably as softening agents for natural or regenerated cellulose, as fabric lubricants and sizing emulsifiers, and as components of whitening agents.

PHYSICAL PROPERTIES OF SYNTHETIC ORGANIC CHEMICALS—1955 Edition——*(Bulletin F-6136, Carbide and Carbon Chemicals Co, 30 East 42nd St, New York 17, N Y*——In 24 pages, this edition presents the latest data on more than 350 organic chemicals. It features 46 new products available from Carbide and Carbon.

The booklet is prepared annually as a handy guide. For easy reference, the chemicals are arranged by family groups with condensed application data. Physical properties are given in tabular form. An alphabetical index is included for the convenience of the user.

PRELIMINARY INFORMATION ON CELANESE ARNEL TRIACETATE——*Celanese Corp of America, Textile Division, Charlotte, N C*——The information contained in this booklet on the performance, versatility, textile processing, price and physical characteristics of Arnel is presented to help answer many questions concerning this new fiber.

PRODUCTS OF HERCULES' SYNTHETIC DEPARTMENT——*Hercules Powder Co, Wilmington, Del*——Includes listing of synthetic resins, plasticizers, pentaerythritol, and nonionic surface-active agents. Certain key properties of the products are included in the listings.

Plasticizers for nitrocellulose, polyvinyl chloride, vinyl chloride-acetate copolymers, and polyvinyl acetate; and nonionic surface-active agents useful as detergents, emulsifiers, and aids in textile processing and petroleum production are covered.

SIPEX——*American Alcolac Corp, 3440 Fairfield Rd, Baltimore 26, Md*——Covers the physical properties of AAC's fatty alcohol sulfates.

SWIFT'S INDUSTRIAL OIL AND FATTY ACID PRODUCTS——*Swift & Co, Industrial Oil Dept, 1800 165th St, Hammond, Ind*——Included are detailed specifications, shipping information, and suggested usage on products of animal, vegetable and marine sources including: oleic acids, red oils, stearic acids, glycerines, hydrogenated and sulfonated products; tallow, lard oils and stearines as well as data on specialized products including defoamers, esters, metal and wool processing oils and Spermaceti USP.——*8 pages.*

TEXTILE MILL CLEANING GUIDE——*Oakite Products, Inc, 19 Rector St, New York 6, N Y*——This handy reference manual contains sections on Textile Washing Operations; Cleaning Procedures for Overhaul Work; Maintenance Cleaning of Machinery; Humidifier, Air Conditioner Maintenance; Plant Maintenance Cleaning; Power Plant Equipment Cleaning; Equipment for Cleaning and Control, Devices for Cleaning.

THE TECHNOLOGY OF SOLVENTS AND PLASTICIZERS——*John Wiley and Sons, Inc (New York); $18.50 per copy*——This book, by AK Doolittle, Carbide and Carbon Chemicals Co, includes chapters on nitrocellulose lacquers, vinyl resin coatings, convertible coatings, and the technology of application. Two entire chapters are devoted to plasticizers. The theoretical discussions will aid those interested in solvent action, viscosity, and the thermodynamics of polymer solutions. The fundamentals of solvent and plasticizer utilization are described at length and illustrated by numerous charts showing how important solvent properties are affected by varying components and conditions.

Some of the sections in the book, in which the author received assistance from others in Carbide and Carbon Chemicals Company, discuss solvent recovery, handling and storage of materials, physiological aspects, and chemical and physical examination of solvents. In addition, Professor Paul M Doty of Harvard University contributed a section on the thermodynamic theory of solutions.

GENERAL CALENDER

AMERICAN SOCIETY FOR TESTING MATERIALS

1955 Committee Week—Jan 31-Feb 4, Netherland Plaza Hotel, Cincinnati, O

1955 Annual Meeting—June 26-July 1, Chalfonte-Haddon Hall, Atlantic City, N J.

AMERICAN SOCIETY FOR QUALITY CONTROL

Annual meeting, Textile Div—Jan 27-29, Clemson College School of Textiles, Clemson, S C.

CANADIAN ASSOCIATION OF TEXTILE COLOURISTS & CHEMISTS (Quebec Section)

Symposia: Feb 11, Mar 18, Apr 15 (Ciba Company's Conference Room, Montreal, Que).

Regular Meetings: Feb 19, Mar 19 (McGill University, Montreal, Que).

Other events: (all at the Sheraton-Mount Royal Hotel, Montreal): Apr 21-23 (Textile Exhibition); Apr 22 (19th Annual Meeting); Apr 23 (19th Annual Dinner); June 18 (Annual Golf Tournament).

DELTA KAPPA PHI FRATERNITY

1955 Annual Convention—April 29-30, Lowell, Mass.

DEUTSCHE GESELLSCHAFT FUR CHEMISCHES APPARATEWESEN

Achema XI—May 14-22, Frankfurt am Main, Germany.

DRYSALTERS CLUB OF NEW ENGLAND

Apr 29 (Hotel Vendome, Boston, Mass); June 24 (Outing—Wachusett Country Club, W Boylston, Mass).

THE FIBER SOCIETY

Spring Meeting—May 4-5, 1955, Alabama Polytechnic Institute, Auburn, Alabama.

Fall Meeting—Sept 8-9, 1955, Massachusetts Institute of Technology, Cambridge, Mass.

INSTITUTE OF POLYMER RESEARCH

Symposium: Feb 4, Mar 5, Apr 2 (Polytechnic Institute of Brooklyn, Brooklyn, N Y).

INTERNATIONAL TEXTILE EXHIBITION

2nd Exhibition—June 25-July 10, 1955, Brussels, Belgium.

INTERNATIONAL WOOL TEXTILE RESEARCH CONFERENCE

September, 1955—Sydney, Melbourne, and Geelong, Australia.

NATIONAL ASSOCIATION OF HOSIERY MANUFACTURERS, KNITTED OUTERWEAR ASSOCIATION, THE UNDERWEAR INSTITUTE

42nd Knitting Arts Exhibition—April 25-29, Convention Hall, Atlantic City, N J.

NATIONAL COTTON COUNCIL OF AMERICA

Cotton Research Clinic—Feb 16-18, Pinehurst, N C

1955 Chemical Finishing Conference—Sept 20-21, Chalfonte-Haddon Hall, Atlantic City, N J.

PHI PSI FRATERNITY

Annual Meeting—April 14-16, Beaconsfield Hotel, Brookline, Mass.

SOUTHERN MUNICIPAL AND INDUSTRIAL WASTE CONFERENCE

4th Annual Conference—Mar 31-Apr 1, College of Engineering, Duke University, Durham, N C.

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION

Feb 9, Mar 9, Apr 13, May 11, Sept 14, Oct 11, Nov 9 (Hotel Commodore, New York, N Y); June 9-11 (Outing——The Greenbrier, White Sulfur Springs, W Va).

TAPPI (Metropolitan District)

Mar 8, Apr 12, May 10 (Fraunces Tavern, New York).

TEXTILE RESEARCH INSTITUTE

25th Annual Meeting—March 10-11, Hotel Commodore, New York, N Y.

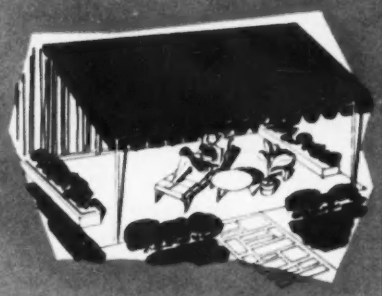
CALCO dyelines

Advertisement No. 41 of a series

Calco

The Most Economical Bright Vat Green

The high tinctorial power of Calcosol* Jade Green N Supra Double Paste and Calcosol Jade Green NP Supra Double Paste makes it the most economical bright vat green on the market.



This all-around vat green has become a true "work horse" of the textile trade and is found in most drug rooms and color shops where exceptional fastness is required in the finished goods. Among other applications, it is recommended for the dyeing or printing of dress and wash goods, toweling, awnings, curtains and draperies.

Calcosol Jade Green is an ideal type of dye from the viewpoint of the dyer or colorist, in that it possesses excellent all-around working properties. It produces practically identical shades when printed on both cotton and rayon. It stands high temperature and is non-tendering.

It is an ideal type of dye from the viewpoint of the consumer in that it possesses excellent fastness to sunlight and washing.

Used with vat yellows (Calcosol Yellow GCP Paste or Calcoloid* Yellow GCD Paste), Calcosol Jade Green gives a wide range of clean brilliant greens ranging from chartreuse to a kelly green. Used with vat blues (Calcoloid Blue BLNS Double Paste), it produces a wide range of blue-green shades.

A NEW WATER-SOLUBLE WHITENER ...CALCOFLUOR* WHITE RWS

Since the introduction of our whitening agent, Calcofluor White RW, the desire has been expressed to have a similar brightener which is water-soluble with a bluish shade that would satisfy the exacting needs of today's market.

To meet this need, Calcofluor White RWS has been developed.

Calcofluor White RWS converts the unseen ultraviolet light to visible blue light, thereby giving a much whiter and brighter appearance when applied to wool, nylon, acetate, pure silk and Orlon. Its water-solubility makes it easy to prepare for normal application procedures. Calcofluor White RWS may be applied by exhaustion or padding, either as a separate treatment during wet processing, or in combination treatments during chemical washing, rinsing, and bleaching, discharge printing, pastel dyeing or application of finishing agents.

Calcofluor White RWS is indeed a step forward in textile finishing for whiter and brighter standards.

*Trade-mark

Quick Tips

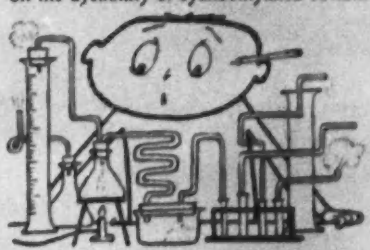
To make pail-washing easier and save time in the drug room, construct a metal grating about 4" from the floor and insert through the grate one or more ½" water lines. The whole is built in a shallow concrete sink equipped with a drain. As used pails are returned to the drug room they are placed upside down on the rack, over the water line, and the faucet is turned on. Washing is taken care of automatically, relieving drug room hands for other duties.

When premature surface oxidation of cloth occurs between the chemical padder and the steamer because the distance is too great or the speed is low, add 1 to 2 ounces of sodium sulfide per gallon to the chemical pad liquor.

Cross-overs on packages are prevented or minimized by allowing the dyebath to saturate the dry packages as it enters the kier by gravity, without pump pressure and before the yarn swells. After circulating two pump cycles, the pump can again be stopped and the packages allowed to relax for a few minutes.

For the Textile Bookshelf

A Preliminary Study of the Dyeing of Cyanoethylated Cotton (Dyestuff Technical Bulletin No. 837). An early report on results of studies being conducted at the Bound Brook Laboratories, American Cyanamid Company, on the dyeability of cyanoethylated cotton.



From 4 to 6 weeks of manufacturing time and approximately 100 controlled tests are required to make a Calco® Vat Dye.

Portrait by Fabian Bachrach

Bell Aircraft has 13,000 payroll savers

"From every point of view, the purchase of U. S. Savings Bonds contributes to the soundness of our economy and to the individual security of our citizens. I am proud that at Bell Aircraft our employees are helping to strengthen the national economy and their own future security through the Payroll Savings Plan.

"In a recent campaign Bell employees achieved a record of nearly 99% participation in the Payroll Savings Plan, bringing to 13,000 the total number of our employees who are saving systematically through the regular purchase of Savings Bonds."

LARRY BELL, *President Bell Aircraft Corporation*

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Advertisements in this section are restricted to HELP WANTED — POSITIONS WANTED — EQUIPMENT wanted or for sale. Rates, effective February 1, 1954: One-time, $10.00 per column inch; 3 consecutive times (same copy), $9.00 per column inch; 13 or more times, $8.00 per column inch; Position Wanted, $2.00 per column inch. Figure 35 average words per column inch. Publisher reserves the right to reject or discontinue any classified advertisement. Replies should be addressed: Box Number . ., c/o American Dyestuff Reporter, 44 East 23rd Street, New York 10, N. Y.

ABSTRACTING SERVICE—Abstracting and digesting of foreign patents and periodicals. Literature review and special reports in dyestuff and cellulose chemistry. PAUL WENGRAF, 88-36 ELMHURST AVENUE, ELMHURST 73, NEW YORK.

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TEXTILE ENGINEER—Experience in wet extrusion. Design and development of laboratory and pilot plant equipment. Progressive company entering new field. Excellent opportunity to develop into high-level position. Central New Jersey. Please submit resume. Write Box No. 824.

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PLANT CHEMIST OR DYER'S position wanted by chemist with diversified background in dyeing and finishing synthetics. Have experience as laboratory director, dyer, finisher and assistant superintendent. Prefer metropolitan New York, northern New Jersey, or abroad. Write Box No. 830.

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POSITION WANTED: Textile chemist, age 31, experienced dyeing and finishing plant and development of textile chemicals. Desires opportunity in sales or development work. Write Box No. 823.

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POSITION WANTED: Textile Chemist and Dyer. Extensive finishing and laboratory experience. Seeks connection in process development, technical representation, or highly responsible supervisory position in dyeing and finishing plant. Write Box No. 819.

POSITION WANTED: Chemist, with background in dyeing, finishing, spinning, knitting and weaving. 19 years' experience in textile industry, 6 years as manager of technical service department of dyestuff manufacturer. Desires executive position with dyestuff or new fiber industry in United States or Canada. Age 38. Write Box No. 831.

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● Classified Advertisements ●

WANTED: Research Chemist by young, progressive, fast-growing chemical company in Metropolitan, New York area. Must have complete experience on surfactants and detergents. Position available May 1, 1955 at new plant location. Give full particulars in letter as per education and experience. Write Box No. 832.

POSITION WANTED: For manager or high supervisory-chemical engineer graduate. Experienced in finishing plant operations, nitrocellulose formulation and coating, vinyl coating. Extensive background in handling personnel; safety and embossing. Write Box No. 834.

POSITION WANTED: TEXTILE SCREENPRINT COLORIST, desires to change employment, now steadily employed. Experienced azo dyes, soluble vats, acetates, acid dyes and pigments. Prefer work in New York State, willing to settle out of town. Write Box No. 835.

DYER OR ASSISTANT DYER WANTED, with background in dyeing skein yarn and/or sweater piece dyeing. Write Box No. 838.

POSITION WANTED: GROUP LEADER — 11 years' experience in dye, textile auxiliary, and intermediate synthesis and application. Many successful products. Patents. Desires position of increased responsibility. Address replies to Box No. 839.

WANTED: CHEMIST—excellent opportunity in progressive dyehouse—North Jersey. Write Box No. 836.

WANTED: TECHNICAL SALES REPRESENTATIVE—Expanding chemical manufacturer desires sales-service representative to call on machine and screen printers. Must have equivalent of college education, specializing in textile chemistry. Age 25-33. Applications should include education, background and work experience. Write Box No. 837.

POSITION WANTED: 24 years' experience machine and screen printing. Print supervisor-colorist. Experienced all classes of dyestuff on cotton, wool and synthetic. Fully capable of taking charge of print or finishing or color-shop department. Textile chemist, college education. Will consider offer anywhere. Write Box No. 840.

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Improve your products with Wyandotte textile chemicals

In conjunction with the chemical products listed below, Wyandotte customers benefit from four important services: Technical Service – to advise on handling and application; Market Research – guides production of new and improved chemicals to meet future needs: Research and Development – for the development of new products; Traffic Department – advises on savings in transportation costs and time.

Through these services, you may receive detailed information on the products listed by indicating your interest and mailing the coupon below. *Wyandotte Chemicals Corporation, Wyandotte, Mich. Offices in principal cities.*

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☐ **Caustic Soda** — Available as: a liquid in 50% and 74% concentrations, solid, std. flake, ¼" flake, crystal and powder. Rayon grade. Wyandotte's caustic is produced by the mercury-cell process for purity, physical and chemical uniformity.

☐ **Pluronics*** — Wyandotte Pluronics are a series of unique 100%-active (including flake and solid) nonionic surface-active agents of unusually high molecular weight. Ether-type structure results in excellent stability to acids, alkalis, electrolytes. Recommended for wool scouring, warp sizing, carbonizing, dye leveling, soaping and finishing.

☐ **Carbose*** — The various grades of Carbose are technical Sodium CMC. Carbose I is most useful as a warp-sizing agent. Carbose TP is well suited for insoluble Azo colors in textile printing inks, soluble vat colors. Carbose D is useful in soaping-off operations.

☐ **Chlorine** — More than 99.7% chlorine by wt.; available in 16-, 30- and 55-ton tank cars. Examination of every tank car protects purity; assures proper functioning of outlets, safety valve.

☐ **Bicarbonate of Soda** — Meets U.S.P. XIV standards. Available in several screen sizes. Distributor stocks maintained in over 60 principal cities.

☐ **Soda Ash** — A leading producer of soda ash, Wyandotte offers it in five grades. All grades test 58% sodium oxide or better.

☐ **Kreelon*** — Economical surface-active agent. Comes in 40% and 85% active-agent forms; flake or powder. Retains wetting, emulsifying, detergent properties in acid, alkaline or neutral solutions; hard or soft water.

☐ **Purecal*** — (ppt. $CaCO_3$) — Pure, uniform; virtually free from iron, magnesium and alkali salts, abrasive materials. All grades meet U.S.P. XIV standards.

☐ **Halane** — An organic chlorine-liberating compound in powdered form containing 66% available chlorine. Stable to practically all anhydrous builders except caustic and bicarbonates.

☐ Have a Wyandotte representative contact me.

*REG. U.S. PAT. OFF.

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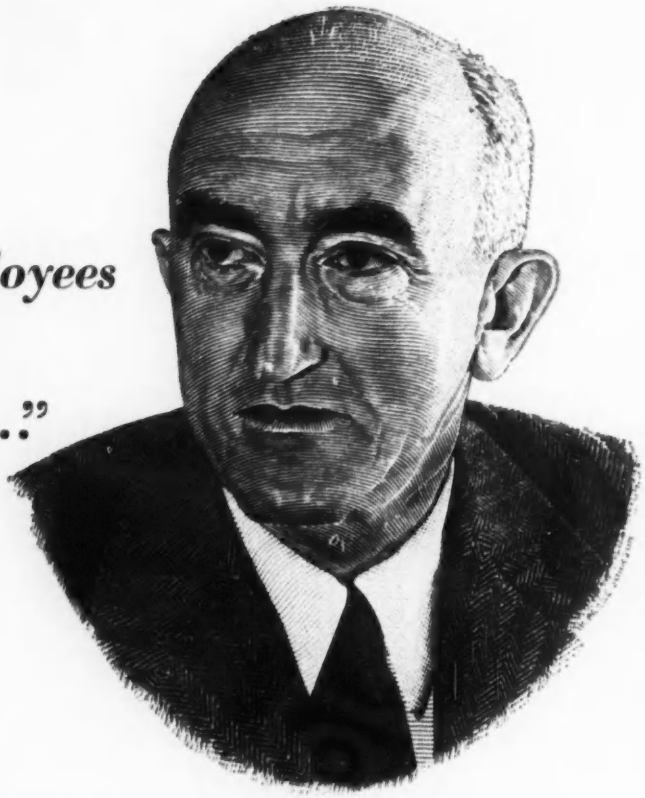
DEPENDABLE SOURCE FOR CHEMICAL RAW MATERIALS

"Boeing's 59,000 employees feel closer to the company..."



WILLIAM M. ALLEN
President
Boeing Airplane Company

"Boeing's 59,000 employees feel closer to the company since our recent successful person-to-person payroll savings drive in the Seattle and Wichita Divisions. Through letters and personal observations many employees have told us they have a greater sense of being a part of the company—that Boeing is interested in the welfare of each and every man and woman on the payroll."

That's the way it is with Payroll Savers. With the realization that systematic investment in U. S. Savings Bonds is a sure road to the down payment on a home, comfortable retirement, or other objectives, comes a better appreciation of a man's job and his company.

To most Payroll Savers, a day's absence from work means just that much out of his take-home savings. And he no longer takes chances, because he wants to stay off the accident list. He looks for better and quicker ways to do his job—promotion will mean more dollars for Savings Bonds. As a stockholder in America he takes a better interest in national affairs, the sound dollar, and economic stability.

91% of Boeing's 65,000 employees—more than 59,000 men and women—are Payroll Savers, as a result of a person-to-person canvass that put a Payroll Savings Blank in the hands of every Boeing employee. Certainly that is a high percentage of which Mr. Allen may well be proud. But it is not exactly unique. A number of the 45,000 companies which have the Payroll Savings Plan have 90% participation: many are in the 80% to 90% group, and many more are in the 60%, 70%, 80% class. In every case, these high percentages followed a person-to-person canvass that put a Payroll Savings Application Blank in the hands of every employee.

If less than 60% of your employees are Payroll Savers, do something about it. A phone call, telegram or letter to "Savings Bond Division, U. S. Treasury Department, Washington, D. C.," will bring prompt assistance from your State Director, U. S. Treasury Department. He will help you install, or revitalize a Payroll Savings Plan, through a simple, person-to-person canvass which your employees will be glad to conduct.

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Barium's flakes dissolve into a PALE YELLOW, SEDIMENT FREE Solution denoting a minimum of IRON or other HEAVY METALS.

MANUFACTURED BY

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South Charleston, West Virginia

Klauder Weldon Giles MODERN DYEHOUSE EQUIPMENT

Specializing in stainless steel construction, Klauder Weldon Giles Machine Company manufactures a wide variety of dyeing, bleaching and scouring machines, including yarn dyeing machines, providing flexible operation on all types of yarn. All Klauder Weldon Giles machines are designed and engineered to meet specific customer requirements.

- RAW STOCK MACHINES
- HOSIERY AND GARMENT MACHINES
- CONTINUOUS YARN SCOURING MACHINES
- TUBS
- DYESTICKS

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DIPYRAZOS (DEVELOPED DYES)

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fatty acids for the textile industry

Century Brand Fatty Acids have been custom-tailored to meet the varying requirements of progressive textile processors.

Century 1405 (Distilled Animal Fatty Acid) has a light color, is odor-free, makes an excellent lubricant, and can be readily sulfated.

Century 1005 (Low Titre Distilled Oleic Acid) is easily saponified to yield an efficient, easy rinsing, sodium soap.

Century 1030 (Low Titre Double Distilled White Oleic Acid) is free from odor, discoloration and rancidity; it finds wide acceptance in emulsifiers and specialty soaps.

Century 1220 (Double Pressed Stearic Acid) is used to make cationic softeners; it gives added permanency to softening effects on cotton and rayon.

Century Hydrex 460 (Hydrogenated Fatty Acid) — Its low Iodine Value insures stability, prevents gumming and hardening when used in size softeners. Readily removable in scouring operation.

Samples and technical data available on the above products. These are but a few of the many Century Products designed for use in textile processing.

Write for a copy of our catalog today.

W. C. HARDESTY CO., Inc.

Century Stearic Acid Products, Inc.

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highly durable

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A New Water Repellent Series Created To Meet Specific Demands!

For Synthetics: — RANEDARE R
Designed specifically for synthetic fabrics for use with crease resistant and stabilizing resins to provide durable water repellency, shrinkage control, wrinkle and spot resistant effects. Easily diluted in cold water. Low foam, has good running properties. Results are durable to dry cleaning and washing. Ranedare has an extremely high shelf life and is very compatible with other resins.

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Especially for use on cotton, to produce high and durbale water repellency. Durable to repeated washings or dry cleanings. Very economical, easily diluted. Has high shelf life. Runs exceptionally well with low foam.

Here are three new ideas — new chemical compounds available for the first time after many plant trials and many thousands of test yards run to prove quality and efficiency.

A Silicone for Synthetics: — RANEDARE S (Formulated from General Electric Wonder Silicone Dri-Film®). Top durability to dry cleaning, even on velvets and sheer fabrics where other durable water repellents fail. High fastness to consecutive washings. Also works well on cottons and wools.

Complete Technical Data — Trial Runs — On Request

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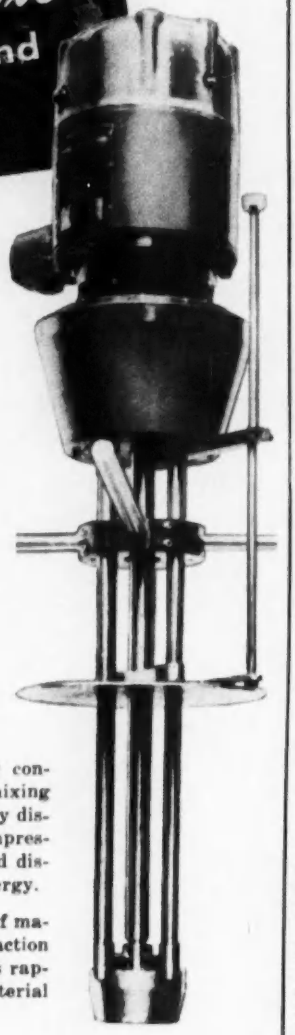
HERMAS

Jet Mixer

for Resin and Lacquer Emulsions



The Shearing Action Breaks Up Agglomerates

Like every comparatively new process, Pigment and Lacquer Printing has problems of its own.

To assure a clean printing job, agglomerates must be broken up and the particles fully dispersed.

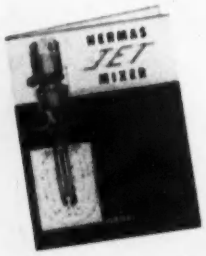
The Hermas Hi-Speed Jet Mixer performs both these functions with top efficiency.

Agglomerates are broken down to particle size because the rotor produces a shearing action against the openings in the plate of the rotor sleeve.

Dispersion is highly efficient

All material in the mixing container is drawn into the mixing chamber where it is immediately disintegrated homogeneously, compressed through the outlet jets, and discharged with high kinetic energy.

This continual recirculation of material, aided by the pumping action of the pitched turbine blades, is rapidly repeated until all the material is uniformly treated.



For full description of the mixer write for four-page illustrated folder giving explanation of principle of operation, mixer sizes, working capacities, typical applications, and other helpful data.

Hermas

MACHINE COMPANY

HAWTHORNE, NEW JERSEY

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Screen and Roller Printers: After long months of research Arnold, Hoffman has developed an *improved* Ahcovat Soluble Green IB Paste.

* Actual storage conditions and extensive laboratory tests have proved the superior *print paste stability* of this Ahcovat Soluble dye.

Ahcovat Soluble Green IB has excellent brightness and fine working and fastness properties.

If you prefer a paste you'll prefer Ahcovat Soluble Green IB Paste . . .

Ask for samples.

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BIXAMINE FAST RED 6BLL

A direct cotton and rayon dye of outstanding fastness to light

- **Easy to apply**
- **Level dyeing**
- **Acetate effects remain white**
- **Fast to dry cleaning**

Write for sample and shade card

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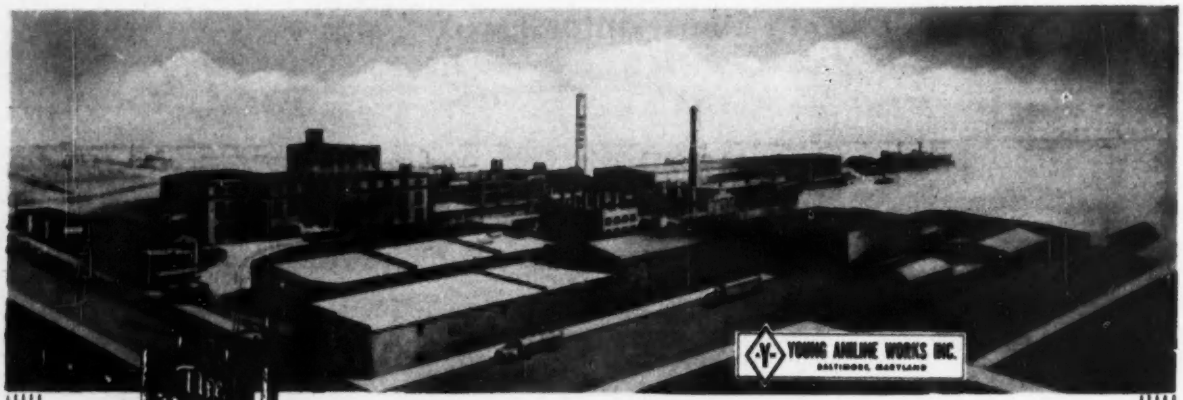

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